DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES
Solid and Hazardous Waste Bureau
Solid Waste Program
STAN STEPHENS, GOVERNOR (406) 444-1430
FAX #(406) 444-1499
STATE OF MONTANA
OFFICE LOCATION: 836 Front Street Helena, Montana
MAILING ADDRESS: Cogswell Building Helena, MT 59620

June 23, 1992

CERTIFIED MAIL

Mr. Marvin Mintyala
Mister "M" Disposal
P.O. Box 369
Lewistown, Montana 59457

RE: MISTER "M" DISPOSAL LANDFILL, FERGUS COUNTY - LICENSE NO. 302
HYDROGEOLOGICAL AND SOILS STUDY/REPORT, GROUNDWATER MONITORING PLAN, & GROUNDWATER SAMPLING AND ANALYSIS PLAN

Dear Mr. Mintyala:

The above referenced landfill has been ranked as one of the more hydrogeologically sensitive landfill sites in the State of Montana, according to the Groundwater Protection Strategy issued by the U.S. EPA in 1984. This evaluation concept is based on the need for differential protection of groundwater depending on its resource value.

Due to the proximity of the Mister "M" Disposal site to potentially vulnerable groundwater and surface water resources, as well as the criteria that has been established in 75-10-207 of the Montana Code Annotated (MCA) for municipal solid waste landfills and other disposal sites, the Montana Department of Health and Environmental Sciences, Solid Waste Program (the Department) is requiring the above referenced landfill to comply with the Administrative Rules of Montana (ARM), Title 16, Chapter 14, Subchapter 7, Groundwater Monitoring Regulations. Specific points of compliance are discussed below.

Hydrogeological and Soils Study

The Mister "M" Disposal site is required to monitor the groundwater based on the following: the landfill has accepted household waste, it was in operation as of October 1, 1989 and serves a population of 5,000 or more persons (see 75-10-207, MCA). Therefore, the Department, according to the Administrative Rules of Montana (ARM) 16.14.703(1)(c)(ii) requires the owner/operator of this solid waste

P 552 429 845

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to Mr. Marvin Mittyala Mister "M" Disposal	
Street and No. P.O. Box 369	
P.O., State and ZIP Code Lewistown, MT 59457	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date 6-23-92	

☆U.S.G.P.O. 1989-234-555

PS Form 3800, June 1985

STICK POSTAGE STAMPS TO ARTICLE TO COVER FIRST CLASS POSTAGE, CERTIFIED MAIL FEE, AND CHARGES FOR ANY SELECTED OPTIONAL SERVICES. (see front)

1. If you want this receipt postmarked, stick the gummed stub to the right of the return address leaving the receipt attached and present the article at a post office service window or hand it to your rural carrier. (no extra charge)

2. If you do not want this receipt postmarked, stick the gummed stub to the right of the return address of the article, date, detach and retain the receipt, and mail the article.

3. If you want a return receipt, write the certified mail number and your name and address on a return receipt card, Form 3811, and attach it to the front of the article by means of the gummed ends if space permits. Otherwise, affix to back of article. Endorse front of article **RETURN RECEIPT REQUESTED** adjacent to the number.

4. If you want delivery restricted to the addressee, or to an authorized agent of the addressee, endorse **RESTRICTED DELIVERY** on the front of the article.

5. Enter fees for the services requested in the appropriate spaces on the front of this receipt. If return receipt is requested, check the applicable blocks in item 1 of Form 3811.

6. Save this receipt and present it if you make inquiry.

☆U.S.G.P.O. 1989-234-555

UNITED STATES POSTAL SERVICE

Official Business

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MONTANA DEPARTM[illegible]
AND ENVIRONM[illegible]
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JUL 3 PM 1992 1 59457

U.S. MAIL

PENALTY FOR PRIVATE USE, $300

Print your name, address and ZIP Code here

MONTANA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES
Solid & Hazardous Waste Bureau
836 Front Street
Helena, MT 59620

Attn: P. Potts

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt Fee will provide you the signature of the person delivered to and the date of delivery.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mr. Marvin Mintyala
Mister "M" Disposal
HCR 85, Box 4066
Lewistown MT
59457

4a. Article Number

P 552 429 014

4b. Service Type

☐ Registered ☐ Insured
☒ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery

7-3-92

5. Signature (Addressee)

Marvin E Mintyala

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

PS Form **3811**, November 1990 ☆U.S. GPO: 1991—287-066 **DOMESTIC RETURN RECEIPT**

disposal facility to provide a Hydrogeological and Soils Study/Report (see ARM 16.14.703) to the State. The culmination of this report should center on the installation of groundwater monitoring wells (locations to be defined according to ARM 16.14.704), in an effort to establish an adequate and accurate groundwater monitoring network [see ARM 16.14.707(1)(b)].

Workplan

A Workplan for this Study/Report must be presented to the State for approval within 90 days from your receipt of this formal notification letter. The Workplan should outline necessary research, field activities, locations of the proposed soil borings/test pits and groundwater monitoring well installations, as well as any lab and/or field tests needed to meet the data requirements for the final Hydrogeological Study/Report.

Please note the specific ARM standards for the number of borings and/or test pits required at the site [see ARM 16.14.703(1)(a)(x)(K)(III)], location and number of groundwater monitoring wells (see ARM 16.14.704), and the construction standards/requirements for groundwater monitoring wells (see ARM 16.14.705) to be installed around the perimeter of the waste disposal area(s). A deviation from the required number of borings and/or test pits may be requested in the Workplan, as long as adequate geologic, soils and hydrologic characterization of the site can be provided. A schedule of the dates for each event (e.g. soil borings and/or backhoe pits, groundwater monitoring well installations and development, etc.) must also be incorporated in the Workplan.

Following State approval of the Workplan, the necessary operations, tests, and studies can begin in an effort to finalize the complete Hydrogeological and Soils Study/Report and a Groundwater Monitoring Plan. As stated in Arm 16.14.703(1)(c)(ii)(C), this report must be submitted no later than 180 days after the Workplan is approved by the Department.

Groundwater Monitoring Plan

Coincident with groundwater monitoring well installations around the perimeter of the waste disposal areas as required in the Hydrogeological and Soils Study/Report, a Groundwater Monitoring Plan, according to ARM 16.14.707(1)(b) must be submitted.

The groundwater monitoring network will be defined in this report [see ARM 16.14.707(1)(b)(i)], approximate dates for sampling the monitoring wells will be provided [see ARM 16.14.707(1)(b)(ii)], and any updates or revisions to the groundwater monitoring plan due to possible changes in the groundwater conditions at the site [see ARM 16.14.707(1)(b)(iii)] will be included in this Plan.

Sampling and Analysis Plan

Following installation and approval of the groundwater monitoring well network and prior to any groundwater sampling or well monitoring activities in and around the facility, be advised that a Sampling and Analysis Plan (SAP) is required by the State (see ARM 16.14.706). This SAP must be approved in writing by the State prior to implementation. Please note the specified groundwater sampling and measurement frequencies defined in the ARM 16.14.706(4). All wells must be surveyed to mean sea level or a local datum [see ARM 16.14.707(5)]. Minimum required groundwater chemical constituents/sampling parameters are listed in Table I of ARM 16.14.706.

Conclusions

Enclosed is a copy of the most current (12/31/91) Solid Waste Groundwater Monitoring Regulations for the State of Montana (i.e. Subchapter 7), a copy of the standard groundwater monitoring well construction diagram and groundwater monitoring well development form. Please review this information carefully.

The Mister "M" Disposal site Workplan submittal will be due 90 calendar days from your receipt of this letter, or no later than September 28, 1992. Submittal date for the final, completed Hydrogeological and Soils Study/Report accompanied by the Groundwater Monitoring Plan will follow 180 days after the Department's approval of the Workplan. Please give me a call if you have any questions pertaining to this formal notification and/or the ARM Subchapter 7 regulations.

Sincerely,

Pat Potts

Pat Potts
Environmental Specialist

Enclosures: ARM Subchapter 7
Groundwater Monitoring Well Construction Diagram
Groundwater Monitoring Well Development Form

cc: Fergus County Commissioners, 712 W. Main St., Lewistown, MT 59457

Roger Godfrey R.S., Central MT Health District, Lewistown, MT 59457

City of Lewistown, 305 Watson Street, Lewistown, MT 5945

File: FERGUS Co
Mr. "M"
groundwtr

MISTER "M" DISPOSAL
HCR 85 BOX 4066
LEWISTOWN, MT 59457

October 29, 1992

RECEIVED
OCT 30 1992
MONTANA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES
SOLID AND HAZARDOUS WASTE BUREAU

Pat Potts
DHES
Solid Waste Bureau
Cogswell Building
Helena, Mt 59620

Dear Pat

I am writing to request a 45 day extension of time to complete the paperwork needed for the groundwater monitoring work plan.

I will be able to visit with Mr. Gillespie from Abenaki Geoenvironmanetal, Inc this next week. He has been out of state off and on and I have only this week gotten in contact with him. He has assured me he is free to work with me on my landfill workplan.

Please let me know your decision as soon as possible. I will be back in the office next week as I am done driving vacation relief as of Friday evening this week.

Sincerely

Marvin E Mintyala

Marvin E Mintyala
Mister "M" Disposal

HCR 85 BOX 4060
LEWISTOWN, MT 59457

October 29, 1992

Pat Potts
DHES
Solid Waste Bureau
Cogswell Building
Helena, MT 59620

Dear Pat

I am writing to request a 45 day extension of time to complete the paperwork needed for the groundwater monitoring work plan.

I will be able to visit with Mr. Gillespie from Abonaki Geoenvironmental, Inc this next week. He has been out of state off and on and I have only this week gotten in contact with him. He has assured me he is free to work with me on my landfill workplan.

Please let me know your decision as soon as possible. I will be back in the office next week as I am done during vacation relief as of Friday evening this week.

Sincerely

Marvin E McIntyre
Minter "M" Disposal

Fergus Co.

ROUTE SLIP

DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES

TO: "Proofer" DATE: 6/22/92

1. Pat C. / Jim W.
2. Jon D. JD
3. Duane DR ? Carol U.?

- [x] Approval
- [ ] Comment
- [ ] Necessary Action
- [ ] Note and Return
- [ ] Note and File
- [ ] Investigate
- [ ] Prepare reply
- [ ] Signature
- [ ] See Me
- [ ] As requested
- [ ] For your information
- [ ] Per Conversation

REMARKS:

same as Glendive, & Deer Lodge

path: sw\mrm.gwt

mailed 6-23-92 lh

FROM: P3

Fergus

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES
Solid and Hazardous Waste Bureau
Solid Waste Program
(406) 444-1430
STAN STEPHENS, GOVERNOR
FAX #(406) 444-1499
STATE OF MONTANA
OFFICE LOCATION: 836 Front Street Helena, Montana
MAILING ADDRESS: Cogswell Building Helena, MT 59620

November 4, 1992

Marvin Mintyala
Mister "M" Disposal
HCR 85 Box 4066
Lewistown, Montana 59457

RE: **MISTER "M" DISPOSAL CLASS II LANDFILL**, FERGUS COUNTY - LICENSE NO. 302
EXTENSION FOR WORKPLAN: HYDROGEOLOGICAL AND SOILS STUDY.

Dear Mr. Mintyala:

The Montana Department of Health and Environmental Sciences Solid Waste Program (the Department) received your letter dated October 29, 1992 requesting a 45-day extension for the submittal of a Workplan for the required Hydrogeological and Soils Study at the above referenced facility. The Department will agree to a **45 calendar day** extension from the date of this letter for the submittal of this Workplan.

The Department had hoped to be able to expeditiously approve the Workplan so that field work could be well under-way before extreme winter weather conditions prevail. We sincerely hope that you will be able to submit this Workplan within this extended period of time. Based on the review and approval of this Plan, efforts can then be made to schedule the field work within an adequate time-frame to meet the 180-day deadline for the Hydrogeological and Soils Study Report.

The Workplan for the Mister "M" Disposal facility will be due on **December 21, 1992.** We hope to be able to work closely with you and your designated technical staff to minimize efforts in the development of a technically correct and practical characterization of the site.

If you have any questions, please give me a call.

Sincerely,

Pat Potts

Pat Potts
Environmental Specialist

cc: Fergus County Commissioners, 712 W. Main Street, Lewistown, MT 59457

Roger Godfrey, R.S., Central MT Health District, Lewistown, MT 59457

City of Lewistown, 305 Watson Street, Lewistown, MT 59457

file: sw\mrm.ext

CU

ROUTE SLIP

DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES

TO: Proof LH DATE: 11/4/92

1. Jim W JW
2. Pat C PC JD
3. Duane DLR

- [x] Approval
- [ ] Comment
- [ ] Necessary Action
- [ ] Note and Return
- [ ] Note and File
- [ ] Investigate
- [ ] Prepare reply
- [ ] Signature
- [ ] See Me
- [ ] As requested
- [ ] For your information
- [ ] Per Conversation

REMARKS:

SW\MRM.EXT

mailed 11-5-92 lm

FROM: P3

No JVs @
Mr. M.

File: Fergus co
Mister M
grd wtr

Abenaki
Geoenvironmental, Inc.

January 29, 1993

Ms. Pat Potts
Dept. of Health and Environmental Services
Solid and Hazardous Waste Bureau
836 Front Street
Helena, MT 59620

Subject: Proposed Work Plan for Site Characterization
Mr. M Landfill Site
Lewistown, Montana

Dear Ms. Potts:

In accordance with our recent conversations we have prepared a work plan for characterization of the above referenced site. The plan has been prepared in general accordance with ARM 16-765, Subchapter 7.

We have gathered all readily available data with respect to the site and interviewed the owner/operator of the facility, Mr. Marvin Mintyala. Please note that published geotechnical information for the Lewistown area is limited and that we have utilized our own files to the extent possible. The work plan is structured with the reader/user in mind and does not follow the outline presented in Subchapter 7 *per se.*

If you have any questions or need further data please contact us.

Very truly yours,
ABENAKI GEOENVIRONMENTAL, INC.

Robert W. Gillespie, P.E.
Principal Geotechnical Engineer

RWG:mah
cc: Marvin Mintyala (1)

P. O. BOX 1018 LEWISTOWN, MT 59457 (406) 538-5800

PROPOSED WORK PLAN
FOR
SITE CHARACTERIZATION
OF
MR. M LANDFILL
LEWISTOWN, MONTANA

TO

MONTANA DEPT. OF HEALTH AND ENVIRONMENTAL SERVICES
SOLID AND HAZARDOUS WASTE BUREAU
HELENA, MONTANA

PREPARED
BY

ABENAKI GEOENVIRONMENTAL, INC.
LEWISTOWN, MONTANA

JANUARY 1993

INTRODUCTION

The purpose of the accompanying work plan is to provide the rationale for characterizing the Mr. M Landfill site in Lewistown, Montana. The work plan has been designed to utilize those data which are both available and valid, and to incorporate and correlate them with new data which are generated by the work proposed herein. The regulations promulgated in Subchapter 7 have been followed in the general case but deviations were necessary to accommodate the available data. Protocols for sampling, preservation, and transportation will be those recommended by NWWA and EPA.

The regulations contained in Subchapter 7 require that the site be characterized with respect to disposal, surficial geology, geohydrology, and hazards. Potential problems relating to the operation of the landfill and its environs must be identified and mitigation techniques developed as appropriate. Any situations involving hazardous wastes and/or substances must be identified and corrected.

The work plan is presented in sections which logically follow one another. Data are tabulated wherever possible for ease of reference and understanding, logic for deviations or alterations to the regulations are explained in detail.

BACKGROUND

The landfill is located on the north side of Hwy. 200 approximately 3 miles east of Lewistown, Montana; a locus map is provided on Figure 1. More specifically, it is an approximately 49 acre parcel located in the SW1/4 of Section 8, Township 15N, Range 19E. The site has been operated as a landfill since the mid 1970's and was purchased by Marvin and Sandra Mintyala in the early 1980's. The waste stream appears to be exclusively residential and light commercial with occasional acceptance of junk cars. Observed wastes were high in paper and plastic content with metals limited to food cans and the like. Few aluminum cans were observed at any location with the exposed working area. White goods and ferrous metals are accepted and stockpiled for transfer to scrap dealers and other appropriate disposal facilities.

Records review show that no monitoring or other environmental observations have been conducted on a regular basis at the facility. Several spot checks by DHES personnel are on file but contain only limited information.

The site characterization which is required by regulation has been requested by DHES in order to bring the Mr. M Landfill in compliance with existing statutes. The

INTRODUCTION

The purpose of the accompanying work plan is to provide the materials for characterizing the Mr. M Landfill site in Lewistown, Montana. The work plan has been designed to utilize those data which are both available and valid, and to incorporate and correlate them with new data which are generated by the work proposed herein. The regulations promulgated in Subchapter 7 have been followed in the general case but deviations were necessary to accommodate the available data. Protocols for sampling, preservation, and transportation will be those recommended by NMWA and EPA.

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The work plan is presented in sections which logically follow one another. Data are tabulated whenever possible for ease of reference and understanding, logic for deviations or adaptations to the regulations are explained in detail.

BACKGROUND

The landfill is located on the north side of Hwy. 200 approximately 3 miles east of Lewistown, Montana; a locus map is provided on Figure 1. More specifically, it is an approximately 40 acre parcel located in the SW1/4 of Section 8, Township 16N, Range 15E. The site has been operated as a landfill since the mid 1970's and was purchased by Myron and Sandra Mikeska in the early 1980's. The waste stream appears to be exclusively residential and light commercial with occasional acceptance of junk cars. Observed wastes were high in paper and plastic contain with metals limited to food cans and tire rims. Few aluminum cans were observed at any location within the exposed working area. While goods and various metals are accepted and stockpiled for transfer to scrap dealers and other appropriate disposal facilities.

Records review shows that no monitoring or other environmental observations have been conducted on a regular basis at the facility. Several spot checks by DHES personnel are on file but contain only limited information.

The site characterization effort is required by regulation has been requested by DHES in order to bring the Mr. M Landfill in compliance with existing statutes. The

characterization assumes that the facility will remain a disposal for household and domestic type wastes. Special and/or hazardous wastes are specifically excluded from this site unless the proper investigations, designs, permits, and construction techniques are implemented.

SITE CHARACTERISTICS

Surface

The landfill is situated in a small south facing depression or half bowl. It is operated as both a trench and open disposal facility depending on the area being used. At the time of our visit in late November 1992 waste was being placed in the northwest section of the site. Placement was commensurate with the type of operation in that the waste is dumped, spread and compacted with a dozer, and covered with local borrow which is also spread and compacted with a dozer. Lift thicknesses are generally less than two feet.

Topographically the site is located on a south facing slope which rises to the north and northeast toward the foothills of the Judith Mountains. The overall drainage area is in excess of 4 square miles and appears to drained by Boyd Creek which travels southwest out of the mountains past the southern edge of the site and into the prairie surrounding Lewistown. Numerous subdrainages are included within the basin as illustrated on Figure 2 attached. The landfill is straddles a small ridge or promontory as illustrated on Figure 2. Most of the fill is placed along the crest, and the south and southeastern flanks of the ridge. We also noted a small (less than 2 acres) landfill area which has undergone closure on the south side of the active area. According to Mr. Mintyala the area contains domestic type waste from the Lewistown area.

A large earth cut is located along the northern property line and is accessed by a haul road which travels west and north. Daily cover is extracted from this location and transported to the active work area. The face is, in reality, a high wall in the bedrock underlying the site. More detail is provided in subsequent sections.

Surface water runoff is directed to two roughly parallel drainages which border the landfill. The flow exits through two culverts in the old railroad bed and flows along Hwy. 200 until it enters Boyd Creek about 1500 feet west of the site. Surface runoff from the landfill proper is collected in shallow ditches along the toe and routed to a detention pond just north of the office building near the center of the site. Field observations show the system is reasonably effective although it was not engineered according to Mr. Mintyala.

characterization assumes that the facility will remain a disposal for household and domestic type wastes. Special and/or hazardous wastes are specifically excluded from this use unless the proper investigations, designs, permits, and construction techniques are implemented.

SITE CHARACTERISTICS

Geologic

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If flows are large, a small spillway routes flow from the first pond into a second. A spillway in the second pond acts as an outlet to the western most natural drainage. Silt from both ponds is removed on a regular basis and returned to the landfill area for use as cover.

Several minor seeps were noted at the southern toe of the landfill but flow was insufficient to develop a quantitative estimate. Coloration was light brown to brown orange indicating relatively high iron contents and oxidation of the same. Their source is probably precipitation, and condensation from within the landfill mass. At this time we perceive nothing abnormal or pernicious with the situation.

Subsurface and Ground Water

As presented earlier, little published information is available for the general Lewistown area. A cursory site investigation was made by Botz (1979) which developed limited but useful data with respect to surficial geology; the report is attached as Appendix A. Water well logs were obtained from Montana Bureau of Mines and Geology which provided data on bedrock geology and ground water levels. Reconnaissance mapping was accomplished during our November 1992 site visit.

Surficial soils are probably residual in origin, being derived from the underlying siltstones and sandstones. Thickness is highly variable and least on ridge tops because of aeolian action and erosion by runoff. By the Unified Soil Classification System, the soils are usually SM, ML, and occasionally SC. They are high in calcium, iron, and carbonates, and can deposit carbonate salts under the right conditions. Excellent exposures are provided by the borrow operations for daily cover.

Bedrock is the Cretaceous age Kootenai Formation. The high wall exposure shows about 30 to 35 feet of silty, fine grained, poorly cemented or indurated sandstone underlain by a soft to friable, moderately plastic shale or claystone. At the time of our site visit, the shale was exposed in the road leading to the borrow at the base of the high wall. Water well logs show that the shale layer is apparently continuous over a significant part of the area east of Lewistown. Lithology as developed from the logs consists of sandstones underlain by the aforementioned shale layer followed by alternating layers of sandstone and shale. Water is derived from a "white" or "gray" sandstone unit at depths of 200 to 350 feet. Water is under excess pressure and rises to levels which are 40 to 100 feet below ground surface. Approximate locations based on well log descriptions and/or field reconnaissance are plotted on Figure 3. Elevations of ground water are also shown. The data show that the aquifer is the sandstone unit and that it is confined. The

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Subsurface and Ground Water

As previously noted, still published information is available for the general Lewistown area. A cursory site investigation was made by Boss (1979) which developed limited but useful data with respect to surficial geology; the report is attached as Appendix A. Water well logs were obtained from Montana Bureau of Mines and Geology which provided deep on bedrock geology and ground water levels. Reconnaissance mapping was accomplished during our November 1992 site visit.

Surficial soils are probably residual in origin, being derived from the underlying sandstones and mudstones. Thickness is highly variable and least on ridge tops because of erosion action and wind by nature. By the United Soil Classification System, the soils are usually SM, ML, and occasionally SC. They are high in calcium, iron, and carbonates, and can deposit carbonate soils under the right conditions. Excellent exposures are provided by the borrow operations for daily cover.

Bedrock is the Cretaceous age Kootenai Formation. The high wall exposure shows about 30 to 35 feet of silty, fine grained, poorly cemented to indurated sandstone underlain by a bluish to brown, moderately plastic shale or claystone. At the time of our site visit, the shale was exposed in the road leading to the borrow at the base of the high wall. Water well logs show that the shale layer is some fairly continuous over a significant part of the area east of Lewistown. Lithology as developed from the logs consists of sandstones underlain by the alternanticated shale layer followed by alternating layers of sandstone and shale. Water is derived from a "white" or "gray" sandstone unit at depths of 200 to 350 feet. Water is under excess pressure and rises to levels which are 40 to 100 feet below ground surface. Approximate locations based on well log descriptions and/or field reconnaissance are plotted on Figure 3. Elevations of ground water are also shown. The data show that the aquifer is the sandstone unit and that it is confined. The

data also show that the gradient is to the southwest with a slope on the order of 0.02 to 0.05. The gradient should be considered as regional for the time being because of the sparseness of data. Localized gradients are possible because of the steep topography. The recharge area is probably in the foothills of the Judith Mountains or the Judith Mountains themselves. Well yields are typically less than 10 gallons per minute and water quality has been classified as fair to good. We could not locate any reports of contamination .

The data strongly suggest that the aquifer is protected by the shale layer at depths of 25 to 50 feet. While we would not use the term aquiclude it certainly classifies as an aquitard. Near surface ground water appears to be ephemeral and related to seasons and/or prolonged precipitation events. Botz observed water in one test pit and set a monitoring well to provide an observational point. According to Mr. Mintyala the well has been dry since its installation. Our field observations lead us to believe that near surface ground water is extremely limited.

WORK PLAN

The following work plan has been developed to provide the data requested in 16.14.703 of the ARM. Succinctly, the purpose of the work is characterize the site from a geotechnical standpoint and use those data to design a short and long term monitoring plan for the protection of the environment. Line item descriptions and "bullets" have been use to allow the reader to grasp and digest the essence of the text without having to wallow in excess verbage.

Safety

Our field visit suggests that hazardous materials will not be an issue during the performance of the field portion of the work plan. However, Level C equipment will be on hand for all personnel during the field phase, and the site will abandoned in the event a hazardous or potentially hazardous situation is encountered. If work continues beyond that point a formal health and safety program will be developed for use on site.

Surface

Surficial work is divided into site plan development and geotechnical work. The proposed scope is as follows:

data also show that the gradient is to the southwest with a slope on the order of 0.02 to 0.05. The gradient should be considered as regional for the time being because of the inadequacy of data. Localized gradients are possible because of the steep topography. The recharge area is probably in the foothills of the Judith Mountains or the Judith Mountains themselves. Well yields are typically less than 10 gallons per minute and water quality has been described as fair to good. We could not locate any reports of contamination.

The data strongly suggest that the aquifer is provided by the shale at depths of 25 to 50 feet. While we would not use the term aquifuge it certainly classifies as an aquitard. Near surface ground water appears to be ephemeral and relating to seasons and/or prolonged precipitation events. Both observed water in one test pit and set a monitoring well to provide an observational point. According to Mr. Mikeyala the well has been dry since its installation. Our field observations lead us to believe that near surface ground water is extremely limited.

WORK PLAN

The following work plan has been developed to provide the data requested in TS 14 TEQ of the ARM. Succinctly, the purpose of the work is characterize the site from a geotechnical standpoint and use those data to design a short and long term monitoring plan for the protection of the environment. It is then description and "bullets" have been used to allow the reader to grasp and digest the essence of the text without having to wade in excess verbiage.

Safety

Our field visit suggests that hazardous materials will not be an issue during the performance of the field portion of the work plan. However, Level C equipment will be on hand for all personnel during the field phase, and the site will abandoned in the event a hazardous or potentially hazardous situation is encountered. If work continues beyond that point a formal health and safety program will be developed for use on site.

Subject

Subject work is divided into site plan development and geotechnical work. The proposed scope is as follows:

1. review available low and high altitude aerial photography for the purpose of fault trace and lineament analysis. While none are expected to be found, we believe it to be the prudent course of action.

2. develop a site plan using the aerial photography and USGS quadrangle maps as bases. The plan will be at a scale of approximately 1"=200".

3. conduct reconnaissance surficial and bedrock mapping of the site proper and the surrounding area for a distance of at least 1,500 feet. The data will be displayed on the aforementioned base plan. Emphasis will be placed on structure, stratigraphy, morphology, and potential aquifer recharge zones. The low level photographs will be used for correlative purposes.

4. evaluate all acquired field and office data to determine relationships between topography, structure, and morphology as they relate to the geohydrologic regime. Emphasis will be placed on the influences exerted by the landfill and its continued operation. Locations for subsurface explorations will be selected during this task.

5. prepare an interim report for use by the Bureau and Mr. Mintyala presenting our findings, and confirming or altering the balance of the work plan.

Subsurface

The subsurface section of the work plan is predicated on the data we have acquired to date. We reserve the right to alter the scope as dictated by field conditions but will notify the Bureau immediately of any changes. The regulations require approximately 25 subsurface explorations for this site. However, the well data already gathered are within the same section and should be considered valid for the purposes of this study. Therefore, 17 locations within the landfill site proper are proposed for exploration. Work plan items as follows:

6. excavate, log, and sample 12 test pits at locations generally conforming to the anticipated perimeter of the landfill. The pits

1. review available low and high altitude aerial photography for the purposes of fault trace and lineament analysis. While none are anticipated to be found, we believe it to be the prudent course of action.

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The subsurface section of the work plan is predicated on the data we have acquired to date. We reserve the right to alter the scope as dictated by field conditions but will notify the Bureau immediately of any changes. The regulations require approximately 25 subsurface explorations for this site. However, the well data already gathered are within the same section and should be considered valid for the purposes of this study. Therefore, 17 locations within the landfill site proper are proposed for exploration. Work plan items are as follows:

6. excavate, log, and sample 12 test pits at locations generally conforming to the anticipated perimeter of the landfill. The pits

will be logged and sampled by our geotechnical engineer in general accordance with ASTM and USCS recommendations. Representative soil samples will be preserved in clean 1 liter glass jars for transport to our geotechnical laboratory. The pits will be logged for lithology, structure, and evidence of ground water. In the event ground water is encountered in a test pit, the pit will be allowed to remain open in order to allow the ground water to stabilize. The level will be measured and referenced to a permanent benchmark, and a grab sample will be taken using a sterile bailer. Filtering and preservation will be in accordance with NWWA and EPA protocol.

7. drill, log and sample 5 monitoring wells at the locations shown on Figure 2. The borings would be drilled using rotary techniques with either an air or water matrix. Cuttings would be collected at frequent intervals at the discharge orifice and examined by our geotechnical engineer for soil or rock type and evidence of ground water. All samples will be scanned for volatile organic compounds using an Hnu HW-101 photoionization detector. Any sample which exhibits a positive reading of greater than 2 ppm will be preserved in a sterile 40 ml VOA vial and refrigerated for transport to an analytical laboratory. The rig and its tools will be cleaned prior to entering the site using steam cleaning and appropriate soaps and rinses. Similar cleanings will be accomplished in the event that contamination is encountered during the drilling process.

8. establish monitoring wells in each bore to allow for ground water sampling and level measurements. Table 1 below provides a summary of the anticipated depths and screen lengths.

TABLE I

MONITORING WELL SUMMARY

Well No.	Depth	Screen Interval
1	top of shale	top of shale to 10 ft. above
2	top of shale	top of shale to 10 ft. above
2a	10′ below bottom of shale	bottom of shale to 10 ft. below
3	top of shale	top of shale to 10 ft. above
3a	10′ below bottom of shale	bottom of shale to 10 ft. below
4	top of shale	top of shale to 10 ft. above
4a	10′ below bottom of shale	bottom of shale to 10 ft. below
5	top of shale	top of shale to 10 ft. above

The wells will be constructed in accordance with DHES and NWWA requirements. Elevations of ground surface, top of casing, and top of well will be determined by level survey tied to NGVD datum.

9. purge and sample all wells in accordance with EPA and NWWA protocols to obtain a baseline sample suite from which to design the future sampling and analysis program. Sterile disposable bailers will be used which obviates the need for a rinsate blank sample. Preservation and filtration will be in accordance with the same protocols unless field conditions dictate that other protocols are more appropriate.

10. sample any seeps from the landfill using grab or composite methods.

11. conduct analytical tests on the recovered samples for the parameters listed in Table 1 of ARM 16.14.706 unless field observations and measurements suggest otherwise.

TABLE 1

MONITORING WELL SUMMARY

Well No.	Depth	Screen Interval
1	top of strata	top of strata to 10 ft. above
2	top of strata	top of strata to 10 ft. above
2a	10' below bottom of strata	bottom of strata to 10 ft. below
3	top of strata	top of strata to 10 ft. above
3a	10' below bottom of strata	bottom of strata to 10 ft. below
4	top of strata	top of strata to 10 ft. above
4a	10' below bottom of strata	bottom of strata to 10 ft. below
5	top of strata	top of strata to 10 ft. above

The wells will be constructed in accordance with DHES and NWWA requirements. Elevations of ground surface, top of casing, and top of well will be determined by level survey tied to NGVD datum.

8. purge and sample all wells in accordance with EPA and NWWA protocols to obtain a baseline sample suite from which to design the future sampling and analysis program. Sterile disposable bailers will be used which obviates the need for a rinsate blank sample. Preservation and filtration will be in accordance with the same protocols unless field conditions dictate that other protocols are more appropriate.

10. sample any seeps from the landfill using grab or composite methods.

11. conduct analytical tests on the recovered samples for the parameters listed in Table 1 of ARM 16.44.702 unless field observations and measurements suggest otherwise.

12. conduct index and physical property tests on selected soil and rock samples. Tests would include grain size distribution, Atterberg limits, pH, and organic content. Emphasis will be placeD on grain size distribution because of its usefulness in estimating permeability.

13. conduct in situ permeability tests in each monitoring well using the slug test method unless sufficient water is available for a drawdown test.

Evaluation of Geotechnical Data

The acquisition of data is for the express purpose of characterizing and designing a ground water monitoring program for environmental protection. The following tasks and deliverables are anticipated:

13. evaluate all acquired field, office, and laboratory data with respect to the landfill and its influence on the environment, with emphasis on the geohydologic regime. More specifically, we would address:

    - local hydrology in and around the landfill. TR55 methodology should be adequate.

    - local and regional geohydrology including bedrock and surficial or near surface aquifers. To the extent possible, recharge zones would be defined and a water balance would be calculated. Values of transmissivity, hydraulic conductivity, gradient, porosity, and storativity would also be generated within the limitations of the data.

    - influences of the landfill on surface and ground water flows. Lateral and vertical expansions of the landfill will be included the evaluations.

14. design a ground monitoring plan which will provide the basis for continual evaluation of landfill impacts, if any, on the ground water system(s). The plan would include sampling frequency, changes in standard protocol for sampling if needed, analytic

12. conduct index and physical property tests on selected soil and rock samples. Tests would include grain size distribution, Atterberg limits, pH, and organic content. Emphasis will be placed on grain size distribution because of its usefulness in estimating permeability.

13. conduct in situ permeability tests in each monitoring well using the slug test method unless sufficient water is available for a drawdown test.

Evaluation of Geotechnical Data

The acquisition of data is for the express purpose of characterizing and designing a ground water monitoring program for environmental protection. The following tasks and deliverables are anticipated:

13. evaluate all acquired field, office, and laboratory data with respect to the landfill and its influence on the environment, with emphasis on the geohydrologic regime. More specifically, we would address:

- local hydrology in and around the landfill. TRSS meteorology should be adequate.

- local and regional geohydrology including bedrock and surficial or near surface aquifers. To the extent possible, recharge zones would be defined and a water balance would be calculated. Values of trans-missivity, hydraulic conductivity/gradient, porosity, and storativity would also be generated within the limitations of the data.

- influences of the landfill on surface and ground water flows. Lateral and vertical expansions of the landfill will be included in the evaluations.

14. design a ground monitoring plan which will provide the basis for continued evaluation of landfill impacts, if any, on the ground water system(s). The plan would include sampling frequency, changes in standard protocol for sampling if needed, analytic

parameters, and recommended evaluation methods using appropriate statistical or probabilistic techniques. Formal ground water models such as MODFLOW or MOC do not appear necessary at this writing.

15. provide deliverables which include but are not necessarily limited to:

- base site plan at 1′=200′.
- surficial and bedrock maps at the same scale as the base map.
- ground water contours of the surficial or near surface aquifer and the bedrock aquifer.
- logs and monitoring well construction data using Unified Soil Classification System and ASTM descriptor methods.
- an engineering report describing our findings, conclusions, and recommendations. The latter could include additional ground water monitoring or surface water sampling locations.
- a ground water sampling plan which would encompass frequency, parameters, and data evaluation techniques. The plan will include the formalities of a Sampling and Analysis Plan or SAP.

CLOSURE

The work performed in this study will be conducted by and under the direction of Robert W. Gillespie, P.E. He will be assisted by Cynthia A. Thayer and Mark A. Weritz, P.E., both of whom have directly applicable landfill experience. Energy Labs of Billings, Montana will provide analytical services, and survey services will be accomplished by Civil Design Solutions of Lewistown, Montana. The work will conform in all respects to the requirements of Subchapter 7 and the standard of care exercised by other professional practicing in the general area.

parameters, and cost/benefit evaluation methods using appropriate statistical or probabilistic techniques. Formal ground water models such as MODFLOW or MOC do not appear necessary at this writing.

15 provide deliverables which include but are not necessarily limited to:

- base site plan at 1" = 200';
- surficial and bedrock maps at the same scale as the base map;
- ground water contours of the surficial or near surface aquifer and the bedrock aquifer;
- logs and monitoring well construction data using Unified Soil Classification System and ASTM descriptor methods;
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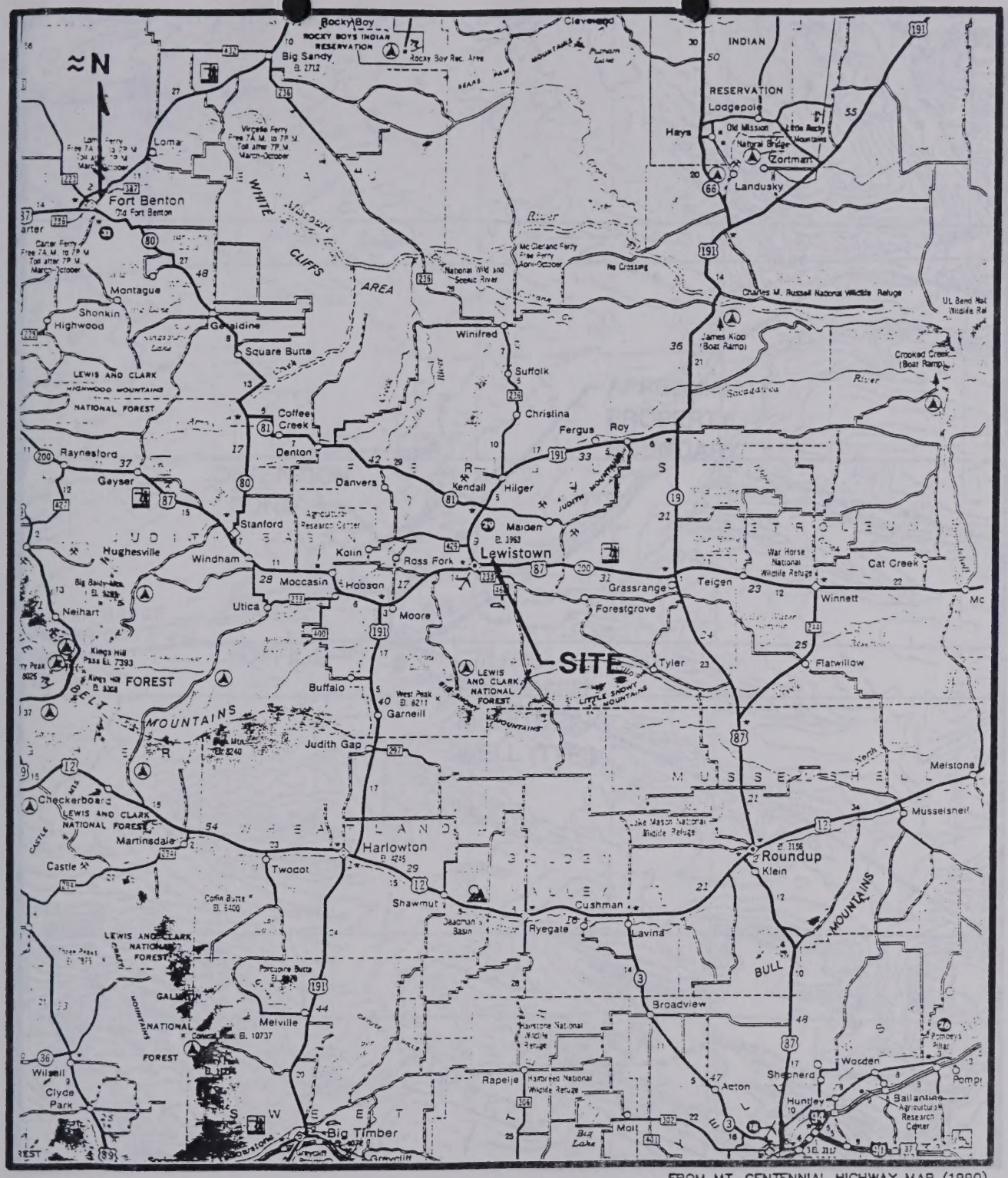
CLOSURE

The work performed in this study will be conducted by and under the direction of Robert W. Gillespie, P.E. He will be assisted by Cynthia A. Tingey and Mark A. Wells, P.E., both of whom have directly applicable landfill experience. Energy Labs of Billings, Montana will provide analytical services, and survey services will be accomplished by Civil Design Solutions of Livingston, Montana. The work will conform in all respects to the requirements of Subchapter 7 and the standard of care exercised by other professional practicing in the general area.



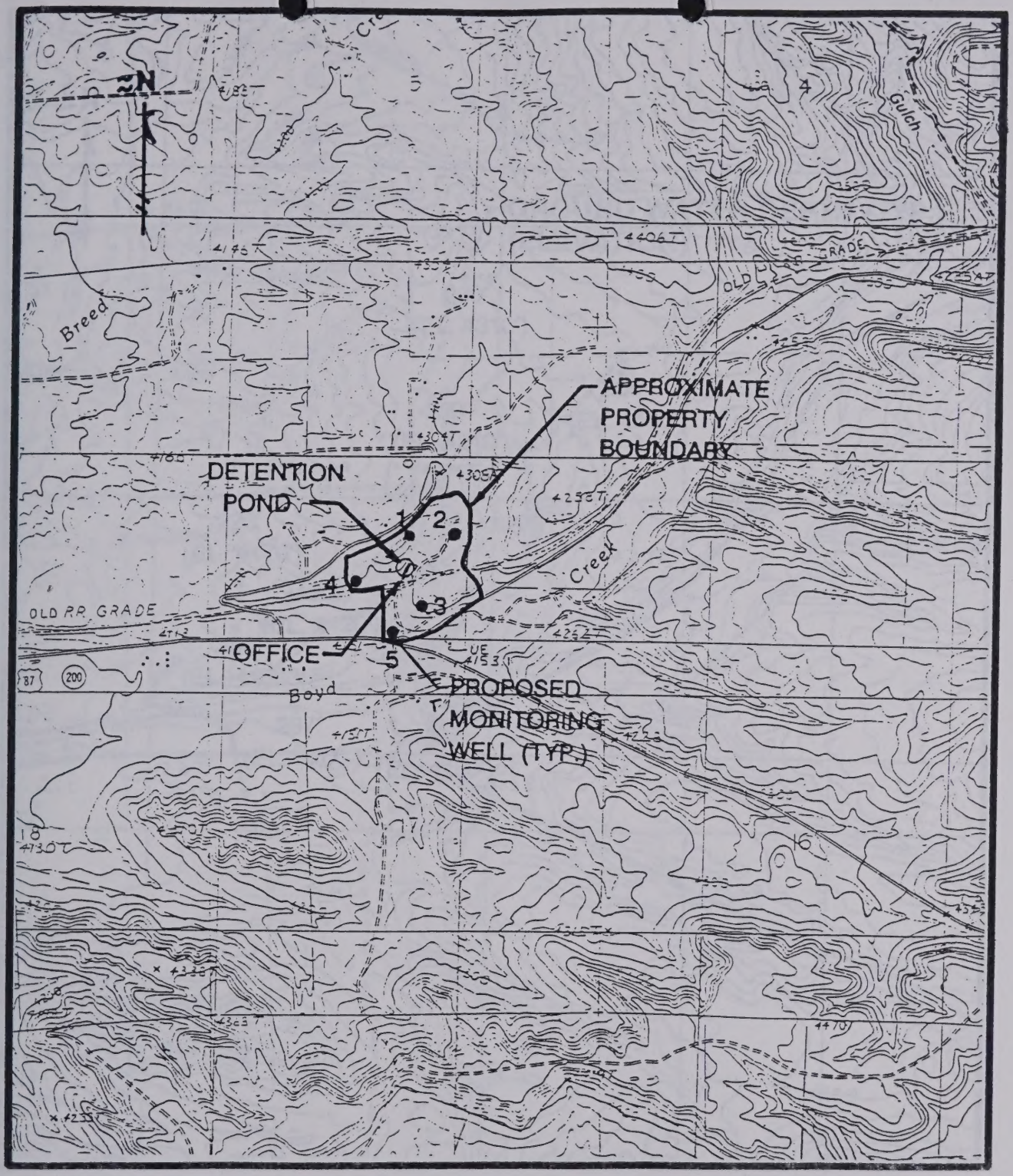
SCALE 1" = 22 MI (APPROX.)

FROM MT. CENTENNIAL HIGHWAY MAP (1990)

LOCUS MAP
WORK PLAN FOR SITE CHARACTERIZATION
MR. M LANDFILL
LEWISTOWN, MONTANA

JANUARY 1993 PROJECT NO. 100-06

Abenaki Geoenvironmental, Inc.
P.O. Box • Lewistown, Montana 59547 • (406) 538-5800



SCALE 1" = 2000' (APPROX.)

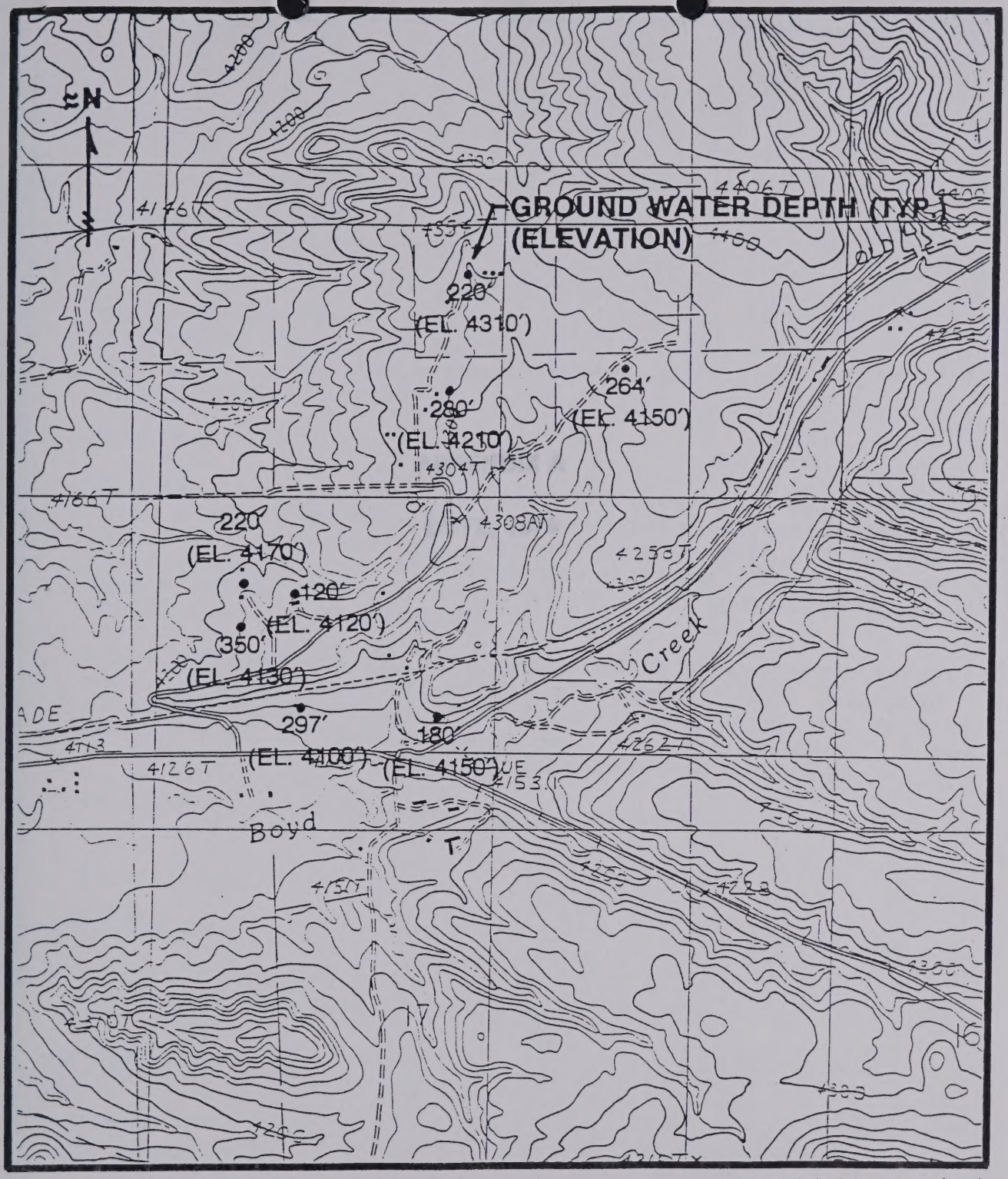
USGS PINE CREEK, MT QUAD (1985)

SITE PLAN
WORK PLAN FOR SITE CHARACTERIZATION
MR. M LANDFILL
LEWISTOWN, MONTANA

JANUARY 1993

PROJECT NO. 100-06

Abenaki Geoenvironmental, Inc.
P.O. Box 8 Lewistown, Montana 59547 • (406) 538-5800



SCALE 1" = 2800' (APPROX.)

USGS PINE CREEK, MT QUAD (1985)

WELL LOCATION AND GROUND WATER PLAN
WORK PLAN FOR SITE CHARACTERIZATION
MR. M LANDFILL
LEWISTOWN, MONTANA

JANUARY 1993

PROJECT NO. 100-06

Abenaki Geoenvironmental, Inc.
P.O. Box • Lewistown, Montana 59547 • (406) 538-5800

APPENDIX A

BOTZ, 1979

HYDROMETRICS
1300 Cedar Street
Helena, Montana 59601
(406) 443-4150

December 12, 1979

Mr. Duane Robertson, Chief
Solid Waste Management Bureau
1400 Eleventh Avenue, Suite A
Helena, Montana 59601

Dear Duane:

Enclosed is my report describing hydrological conditions at two solid waste disposal sites near Lewistown, Montana. Results of this examination indicate portions of each site contain ground-water within 10 feet of the ground surface. Other portions of each of these sites, however, appear to meet all hydrological criteria for Class II sites.

I have delayed sending this report until I received site sketch maps. I have not as yet received these so I have developed rough sketch maps based on my site visits. Good plan maps are still needed for both these sites. I have some photos of the sites that I will send to you when they are processed.

Please call me if you have any questions on this report or need any further information.

Yours truly,

Max

Maxwell K. Botz, P.E.
Hydrologist-Engineer

Max

MKB:bd
Enclosure

December 12, 1970

Mr. Duane Mckenzie, Chief
Solid Waste Management Bureau
1520 Eleventh Avenue, Suite A
Helena, Montana 59601

Dear Duane:

Enclosed is my report describing hydrological conditions at two solid waste disposal sites near Livingston, Montana. Results of this examination indicate portions of each site contain groundwater within 10 feet of the ground surface. Other portions of each of these sites, however, appear to meet all hydrological criteria for Class II sites.

I have delayed sending this report until I received site sketch plans. I have not as yet received these so I have developed rough sketch maps based on my site visits. Good plan maps are still needed for both these sites. I have some photos of the sites that I will send to you when they are processed.

Please call me if you have any questions on this report or need any further information.

Yours truly,

Maxwell E. Hess, P.E.
Hydrologist-Engineer

MEH:bd
Enclosure

HYDROLOGICAL ASSESSMENT OF TWO SOLID WASTE DISPOSAL SITES NEAR LEWISTOWN, MONTANA

for

Mr. Duane Robertson, Chief
Solid Waste Management Bureau
1400 Eleventh Avenue, Suite A
Helena, Montana 59601

by

HYDROMETRICS
1300 Cedar Street
Helena, Montana 59601
406/443-4150

December 12, 1979

HYDROLOGICAL ASSESSMENT OF TWO SOLID WASTE DISPOSAL SITES NEAR LEWISTOWN, MONTANA

In November 1979, at the request of the Montana Solid Waste Management Bureau, two solid waste disposal sites near Lewistown, Montana were examined. Objectives of this examination were to appraise hydrological conditions at these sites and to determine if they meet all requirements for Class II solid waste disposal sites under the rules of the Montana Solid Waste Management Bureau. For solid waste disposal at Class II sites, Montana rules (Section 16-2.14(8)-S14315) require that groundwater be a depth of at least 10 feet beneath the bottom of the proposed landfill site and that permeability of the material underlying the site be less than 10^{-3} (2.83 ft/day). The primary focus of these site examinations was to determine existing groundwater conditions.

Field trips were taken to Lewistown to examine these solid waste sites on November 7, 8, 10 and 21, 1979.

CADOTTE DISPOSAL SITE

The Cadotte disposal site is approximately 2 miles east of Lewistown, Montana along Highway 87 (T15N,R18E,Section 7). This site is on a very small south-facing ephemeral tributary to Boyd Creek. This drainage is bowl shaped and is about 300 feet in diameter. Low hills surround the site and, in past years, portions of the bottom of the drainage have been used for disposal of solid wastes. It was reported by the site owner, Mr. Don H. Cadotte, that the site had a deeply incised stream channel which was backfilled with solid wastes. He also reported that the upper end of this drainage was used to bury wastes by

HYDROLOGICAL ASSESSMENT OF
TWO SOLID WASTE DISPOSAL SITES NEAR
LEWISTOWN, MONTANA

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Field trips were taken to Lewistown to examine these solid waste sites on November 7, 8, 20 and 21, 1979.

CADOTTE DISPOSAL SITE

The Cadotte disposal site is approximately 2 miles east of Lewistown, Montana along Highway 87 (T15N,R19E,Section 17). This site is on a very small south-facing ephemeral tributary to Hoyt Creek. This drainage is bowl shaped and is about 300 feet in diameter. Low hills surround the site and, in past years, portions of the bottom of the drainage have been used for disposal of solid wastes. It was reported by the site owner, Mr. Don E. Cadotte, that the site had a deeply incised stream channel which was backfilled with solid wastes. He also reported that the upper end of this drainage was used to bury wastes by

excavating deep trenches, filling with waste, and covering with soil.

A total of four backhoe pits were dug at this site (Figure 1) to determine subsurface geological conditions and depth to groundwater. The site appears to be underlain by dark-colored marine shales of the Colorado Formation of Cretaceous geological age. Overlying the shale bedrock is a thin mantle of light brown, stony, clayey silt.

The first test pit was dug on November 7, 1979 near the southern end of the proposed disposal site about 90 feet north of the old railroad center line. (See Figure 1.) This area is underlain by approximately three feet of compacted solid waste consisting primarily of wood and metal products. Underlying the solid waste material is a very firm, dark-colored, moist to very moist claystone. A blocky shale typical of the Colorado Formation and harder than the claystone was encountered at a depth of 7 feet. This first test pit was completed at a total depth of 13 feet in a very firm, dense, gray shale. The material was very moist but did not appear to contain free water. Approximately 10 minutes after completion of the test pit, groundwater began seeping into the trench at a depth of an estimated 12½-13 feet. Early the next morning (November 8, 1979), groundwater in Test Pit 1 was approximately 10 feet below the ground surface.

Test Pit 2 was dug on November 7, 1979 approximately 125 feet southwest of Test Pit 1 and near the upstream toe of the abandoned railroad embankment (Figure 1). Test Pit 2 contains approximately 2 feet of solid wastes and is underlain by very firm, blocky, dark-colored shale. At a depth of 10 feet, a slight amount of groundwater seeped into the hole after completion of excavation. On the following day (November 8, 1979), the water surface in Test Pit 2 was 8 feet below the ground surface.

excavating deep trenches, filling with waste, and covering with soil.

A total of four backhoe pits were dug at this site (Figure 1) to determine subsurface geological conditions and depth to groundwater. The site appears to be underlain by dark-colored marine shales of the Colorado Formation of Cretaceous geological age. Overlying the shale bedrock is a thin mantle of light brown, stony, clayey silt.

The first test pit was dug on November 7, 1979 near the southern end of the proposed disposal site about 50 feet north of the old railroad center line. (See Figure 1.) This area is underlain by approximately three feet of compacted solid waste consisting primarily of wood and metal products. Underlying the solid waste material is a very firm, dark-colored, moist to very moist claystone. A block sample typical of the Colorado Formation and harder than the claystone was encountered at a depth of 7 feet. This first test pit was completed at a total depth of 13 feet in a very firm, damp, gray shale. The material was very moist but did not appear to contain free water. Approximately 30 minutes after completion of the test pit, groundwater began seeping into the trench at a depth of an estimated 12½-13 feet. Early the next morning (November 8, 1979), groundwater in Test Pit 1 was approximately 10 feet below the ground surface.

Test Pit 3 was dug on November 7, 1979 approximately 125 feet southwest of Test Pit 1 and near the upstream toe of the abandoned railroad embankment (Figure 1). Test Pit 3 contains approximately 2 feet of solid wastes and is underlain by very firm, moist, dark-colored shale. At a depth of 10 feet, a slight amount of groundwater seeped into the hole after completion of excavation. On the following day (November 8, 1979), the water surface in Test Pit 3 was 3 feet below the ground surface.

After finding groundwater in the lower end of the proposed disposal site, two additional test pits were dug in the northwest portion of the site (Figure 1). Both these pits were dug to a depth of over 10 feet into a shale bedrock consisting of very firm, blocky shale which varied in color from brown to gray. These test holes were dug under the supervision of Bob Childers, sanitarian from Lewistown, on November 8, 1979. On November 10, 1979 no water was observed in these holes by M. K. Botz of Hydrometrics.

Bedrock at the Cadotte site is estimated to have a low permeabilit (less than 10^{-3} cm/sec) and appears to be transmitting a small quantity of groundwater southward toward Boyd Creek. This groundwater probably is derived from local infiltration on the disposal site and possibly from a small drainage north of the disposal site. The small quantity of groundwater from the Cadotte disposal area is not expected to impact groundwater resources except on and very near the site. It is estimated that the quantity of groundwater moving through the site is very small and chances of any off-site impacts are remote.

Approximately one-quarter mile north of the Cadotte site is a much larger east-west trending drainage. This drainage contained a small quantity of ponded water and several cattail patches, indicating continued wet conditions. This wet area appeared to be higher in elevation than the lower portion of the Cadotte site, and could be a source of groundwater recharge to the site.

The major stream drainage in the area is an estimated 400-600 feet south of the Cadotte site, and has a relatively flat ground surface and is underlain by alluvium of unknown thickness. There is one residence south of the site. This residence uses a drilled well to supply household water. The well is in a 10-12 foot deep pit which was constructed using 48-inch CMP

After finding groundwater in the lower end of the proposed disposal site, two additional test pits were dug in the northwest portion of the site (Figure 1). Both these pits were dug to a depth of over 10 feet into a whole bedrock consisting of very firm, blocky shale varied in color from brown to gray. These test holes were dug under the supervision of Bob Chilstrom, municipal from Lewistown, on November 3, 1970. On November 10, 1970 no water was observed in these holes by M. K. Cass of Hydrometrics.

Bedrock at the Cadotte site is considered to have a low permeability (less than 10^{-3} cm/sec) and appears to be transmitting a small quantity of groundwater southward toward Beaver Creek. This groundwater probably is derived from local infiltration on the disposal site and possibly from a small drainage north of the disposal site. The small quantity of groundwater from the Cadotte disposal area is not expected to impact groundwater in sufficient amount on Beaver Creek the site. It is estimated that the quantity of groundwater moving through the site is very small and effects of any off-site impacts are remote.

Approximately one-quarter mile north of the Cadotte site is a much larger east-west trending drainage. This drainage contained a small quantity of ponded water and several metal pipes, indicating continued wet conditions. This wet area appeared to be higher in elevation than the lower portion of the Cadotte site, and could be a source of groundwater recharge to the site.

The major stream drainage in the area is an estimated 400-600 feet south of the Cadotte site, and has a relatively flat ground surface and is underlain by gravels of unknown thickness. There is one residence south of the site. This residence uses a drilled well to supply household water. The well is in a 30-32 foot deep pit which was constructed using 18-inch cup

(corregated metal pipe). The CMP contains a few slots near the ground surface. Near the bottom of the CMP is the well and pressure tank. The well seal has been modified to accommodate the drop pipe and pump wire. Neither the well nor the CMP is sealed to prevent entrance of surface water or debris.

THE MR. M DISPOSAL SITE

This site is approximately 3.1 miles east of Lewistown along Highway 87 in Township 15N, Range 19E, Section 8 and is owned by Mr. Marvin Mintyala. This active site has been used for waste disposal for a number of years. The site is in a small, south facing drainage basin entirely underlain by shales, claystones and sandstones of the Kootenai Formation of Cretaceous geological age. These bedrock strata are nearly horizontal and are reddish brown, yellow, cream and purple, which is typical of this formation. Bedrock is overlain by a thin layer of light brown-colored, silty soil.

A total of 5 test pits were dug on the property by a backhoe to determine subsurface geological and groundwater conditions. A sketch map of the property and backhoe pit locations is shown on Figure 2.

Test Pits 1, 2 and 3 were dug the week of November 19, 1979 under the supervision of Bob Childers. On November 21, 1979 these three test pits were examined and two additional pits were dug. (See Figure 2 for test pit locations.) All test pits were dug to a depth of at least 10 feet and encountered claystone, sandstone and shales of the Kootenai Formation. Generally, the bedrock was weathered near the ground surface and became harder with depth and was relatively fresh in the pit bottoms. Although the soils were very moist in all pits, Test Pit 2 was the only pit that contained groundwater. On November 21, 1979 groundwater was present in Test Pit 2 at

the ground surface. Near the bottom of the cap in the well and pressure tank. The well seal has been modified to accommodate the drop pipe and pump wire. Neither the well nor the cap is sealed to prevent entrance of surface water or debris.

THE MR. W DISPOSAL SITE

This site is approximately 2.1 miles east of Lewistown along Highway 87 in Township 15N, Range 12E, Section 8 and is owned by Mr. Marvin Wirtzfeld. This section site has been used for waste disposal for a number of years. The site is in a small north facing drainage basin entirely underlain by shales, claystones and sandstones of the Kootenai Formation of Cretaceous geological age. These bedrock strata are nearly horizontal and are reddish brown, yellow, green and purple, which is typical of this formation. Bedrock is overlain by a thin layer of light brown-colored, silty soil.

A total of 5 test pits were dug on the property by a backhoe to determine subsurface geological and groundwater conditions. A sketch map of the property and backhoe pit locations is shown on Figure 2.

Test Pits 1, 2 and 3 were dug the week of November 12, 1979 under the supervision of Bob Chilcote. On November 21, 1979 three other test pits were examined and two additional pits were dug. (See Figure 2 for test pit locations.) All test pits were dug to a depth of at least 10 feet and encountered alternions, sandstone and shales of the Kootenai Formation. Generally, the bedrock was weathered near the ground surface and became harder with depth and was relatively fresh in the pit bottoms. Although the soils were very moist in all pits, Test Pit 2 was the only pit that contained groundwater. On November 21, 1979 groundwater was present in Test Pit 2 at

a depth of 8.5 feet below the ground surface.

Bedrock at the Mr. M site as determined from test pits and examination of surfical geology has a very low permeability (less than 10^{-3} cm/sec) and will transmit very little groundwater. Test Pit 5 is about 40 feet from a small pond. The bottom of the pit was several feet lower than the water surface in the pond, yet no groundwater seeped into the test pit during or after excavation. This indicates a very low bedrock permeability. The disposal area is drained by small ephemeral streams that flow water only during spring snowmelt or during periods of intense precipitation. There are two small ponds on the disposal site (Figure 2). As reported by the operator, the largest pond normally contains waters from runoff but dried up by late September or early October 1979. According to the operator, the largest pond overflowed during snowmelt from the severe winter of 1978. However, it normally does not overflow.

The smaller pond contained water in November 1979 and is about 20 feet north of the larger pond. This pond appears to be supplied by water from a small seep near its north end (Figure 2). Several small seeps around the area of buried wastes (Figure 2) are reported by the operator to be caused by horizontal movement of water from the layered, buried wastes. The top of each layer apparently is impervious and causes infiltrating water to migrate laterally to the edge of the buried wastes to form small seeps.

Groundwater present in Test Pit 2 probably is related to water ponded at this site and probably does not indicate a regional groundwater system. This waste disposal site appears to have no impact on groundwater resources.

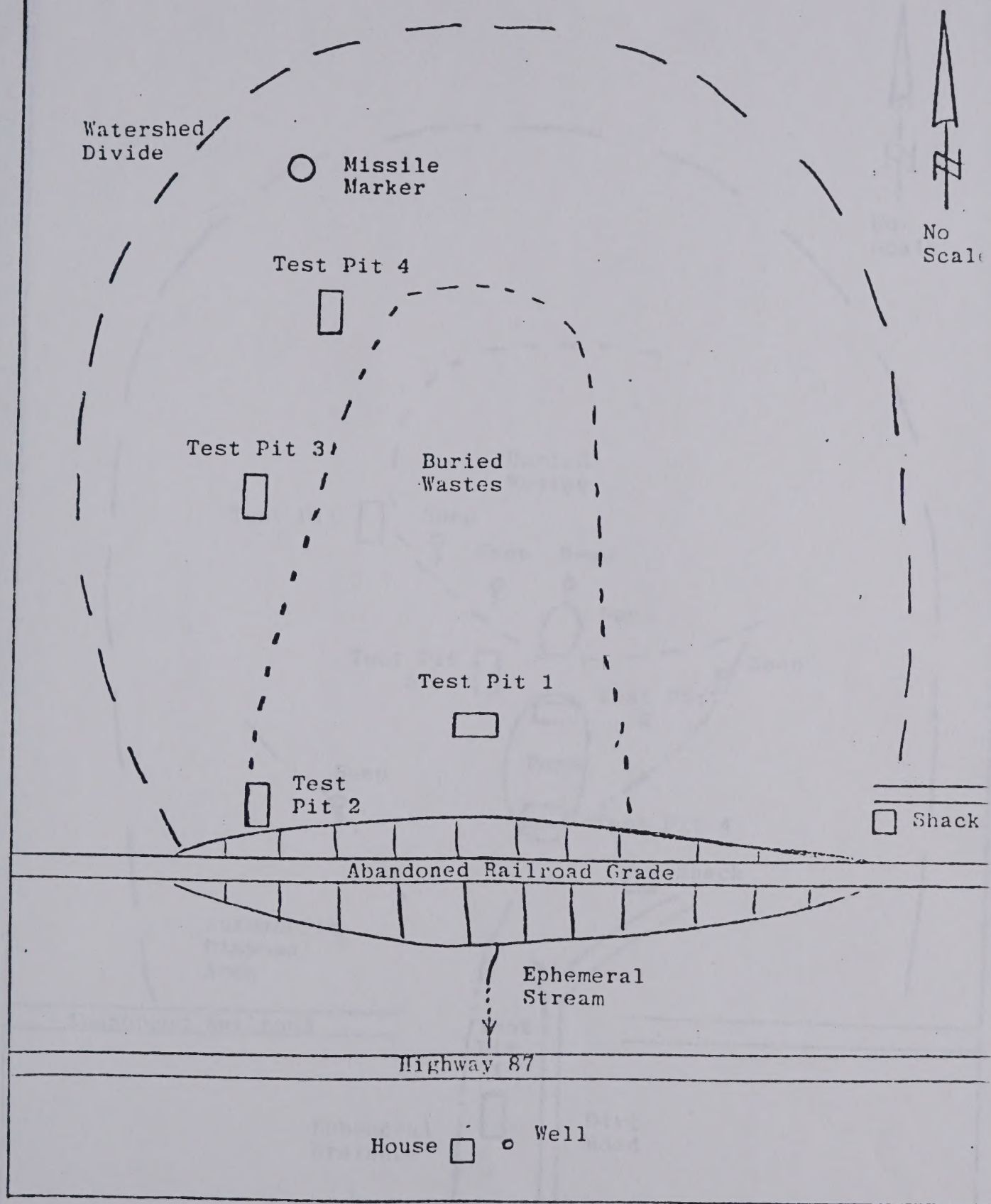

FIGURE 1. SKETCH MAP SHOWING LOCATIONS OF TEST PITS AT THE CADOTTE DISPOSAL SITE

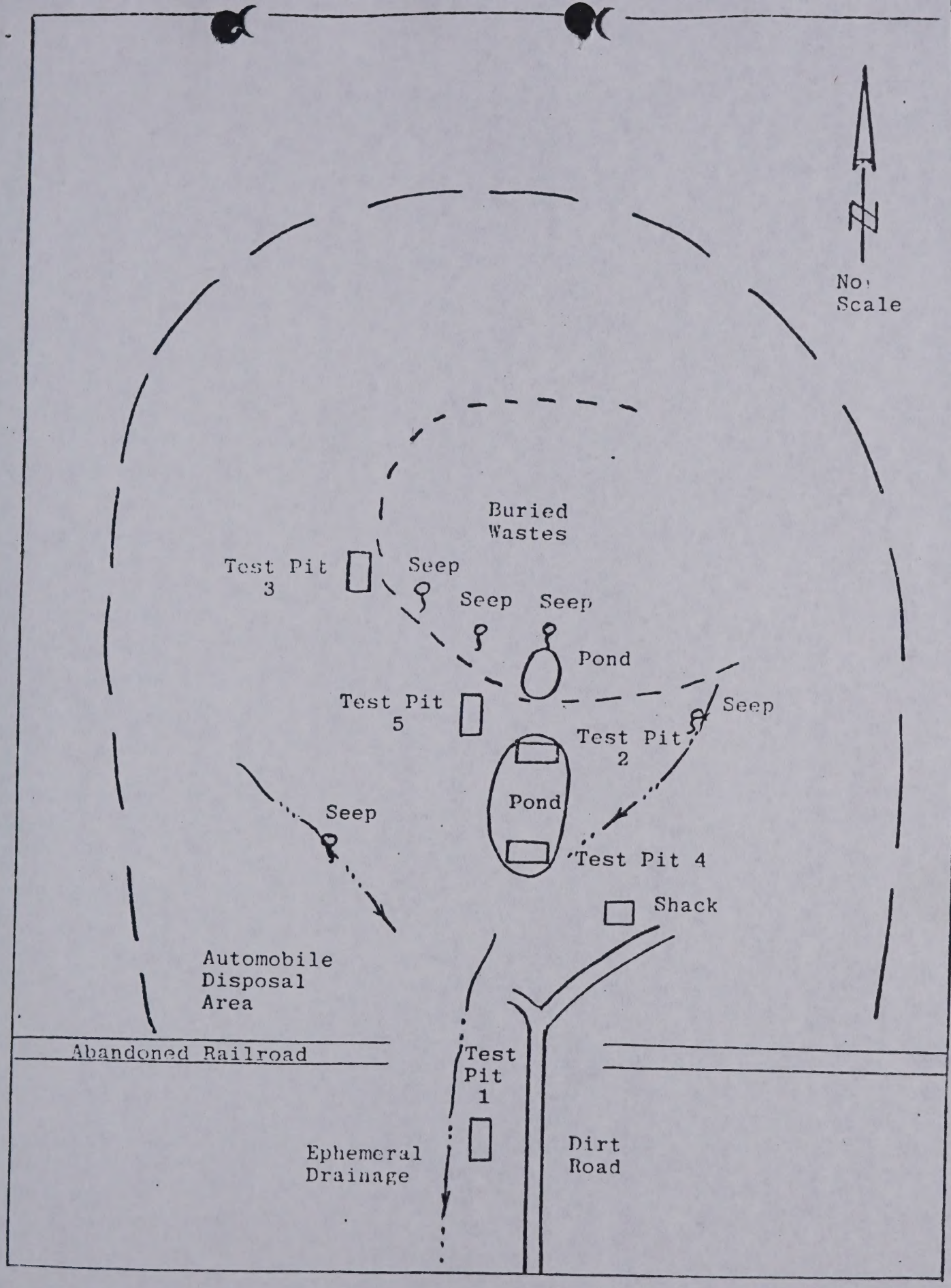

FIGURE 2. SKETCH MAP SHOWING LOCATIONS OF TEST PITS AT THE MR. M. DISPOSAL SITE

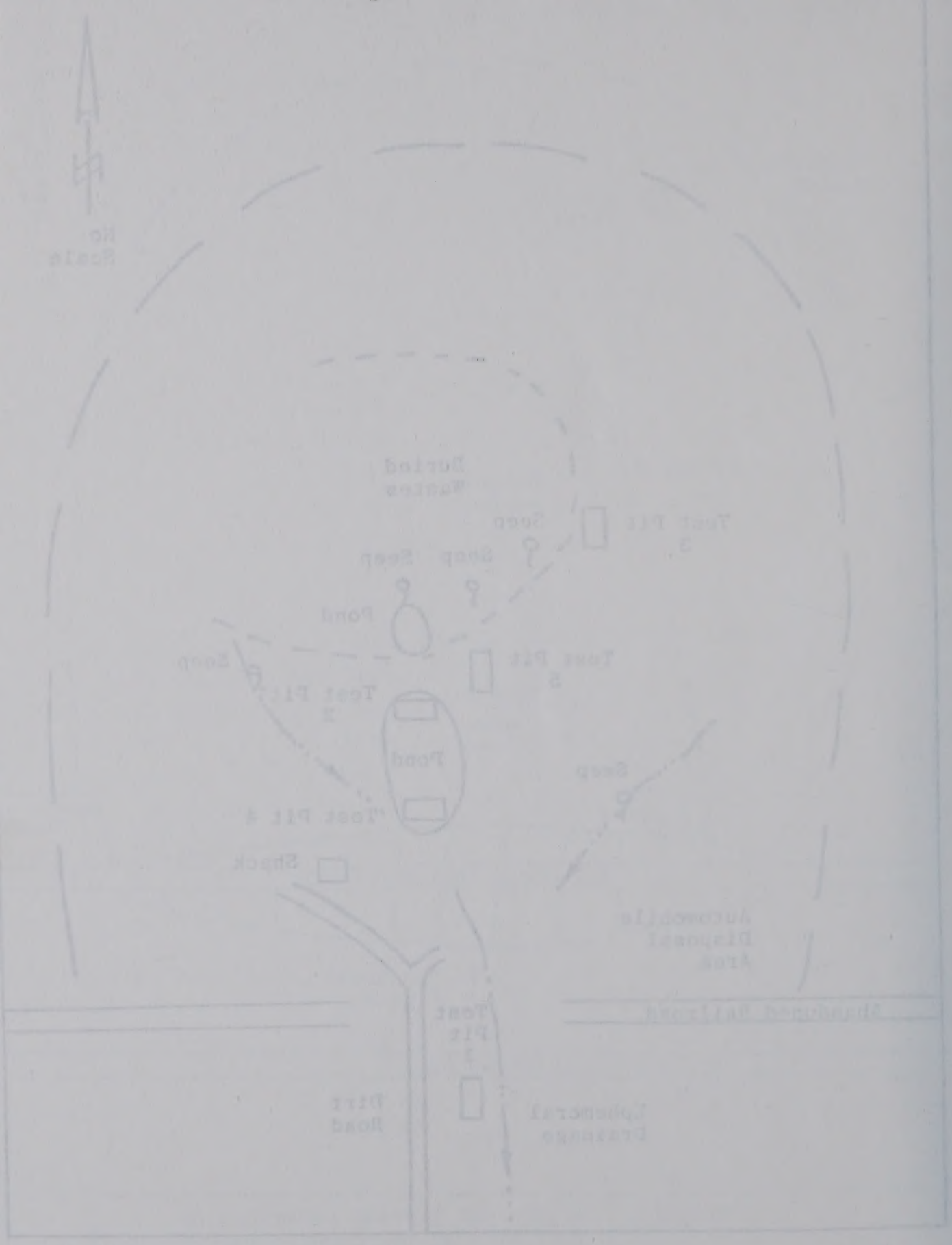

FIGURE 2. SKETCH MAP SHOWING LOCATIONS OF TEST PITS AT THE NR. M. WARDCAS.

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES
Solid and Hazardous Waste Bureau
Solid Waste Program
(406) 444-1430
MARC RACICOT, GOVERNOR
FAX # (406) 444-1499

STATE OF MONTANA

OFFICE LOCATION 836 Front Street Helena, Montana
MAILING ADDRESS: PO BOX 200901 Helena, MT 59620-0901

April 12, 1993

Mr. Marvin Mintyala
Mister M Disposal
HCR 85, Box 4066
Lewistown, Montana 59457

RE: **MISTER M DISPOSAL, CLASS II, FERGUS COUNTY - LICENSE NO. 302**
REVIEW AND COMMENTS ON THE WORKPLAN FOR THE HYDROGEOLOGIC AND SOILS STUDY.

Dear Mr. Mintyala:

The review of the Workplan for the Hydrogeologic and Soils Study (HSS) for the Mister M Disposal facility has prompted the following comments, questions and concerns which need to be addressed in greater detail, or revised to coincide more closely with the objectives outlined in the Administrative Rules of Montana (ARM):

BACKGROUND
#1. In the description of this site, you refer to the site size as being approximately 49 acres. The licensed site is 30 acres. Please provide the source for the 49 acre determination.

SITE CHARACTERISTICS
Surface.
#2. If both the trench and area ("open") disposal methods have been used at this site, with lifts described as being generally less than 2 feet thick; how deep are the trench excavations?

#3. Runon according to 40 CFR 258.2, is defined as "any rainwater, leachate, or other liquid that drains over land onto any part of a facility". Therefore, in the beginning of paragraph 4 of this section, the term "surface water runoff" should be changed to surface water runon.

April 12, 1991

Mr. Marvin Mintyala
Mister M Disposal
HCR 63, Box 1066
Lewistown, Montana 59457

RE: MISTER M DISPOSAL, CLASS II, FERGUS COUNTY - LICENSE NO. 262
REVIEW AND COMMENTS ON THE WORKPLAN FOR THE HYDROGEOLOGIC AND SOILS STUDY.

Dear Mr. Mintyala:

The review of the workplan for the Hydrogeologic and Soils Study (HSS) for the Mister M Disposal facility has prompted the following comments, questions and concerns which need to be addressed in greater detail, or revised to coincide more closely with the objectives outlined in the Administrative Rules of Montana (ARM):

BACKGROUND

#1. In the description of this site, you refer to the site size as being approximately 49 acres. The licensed site is 30 acres. Please provide the source for the 49 acre determination.

SITE CHARACTERISTICS

Surface.

#2. If both the trench and area ("open") disposal methods have been used at this site, with lifts described as being generally less than 2 feet thick; how deep are the trench excavations?

#3. Runon, according to 40 CFR 258.2, is defined as "any rainwater, leachate, or other liquid that drains over, land onto any part of a facility". Therefore, in the beginning of paragraph 4 of this section, the term "surface water runoff" should be changed to surface water runon.

A Montana Pollutant Discharge and Elimination System (MPDES) permit may be required from the Stormwater Runoff Program of the Water Quality Bureau based on the fact that runon diverted around the landfill flows into Boyd Creek.

#4. Surface seeps associated with landfilling activities need to be evaluated in greater detail in relation to how they may, or may not effect the hydrogeology at the site (see ARM 16.14.703(1)(a)(vi).

Subsurface and Ground Water.

#5. Paragraph 1.
Also, concerning the above regulatory citation (under item #4), it will be necessary to provide in the Workplan the lithologic logs and/or well completion data (as available) on all domestic and supply wells within a 2-mile radius of the site to locate possible local ground water receptors.

#6. Paragraph 3.
Approximately how thick is the shale (confining) layer? Use information such as well logs and well completion information available on domestic and/or supply wells in the area for reference.

#7. Paragraph 3.
Please confirm using existing information, the following statements from the Workplan text:

" Water is derived from a "white" to "gray" sandstone unit at depths of 200 to 350 feet (assumed, BGS). **Water is under excess pressure and rises to levels which are 40 to 100 feet below ground surface."**

Specifically, does this mean there could be 160 to 250 feet of hydraulic head? Does the head of the confined aquifer exceed the thickness of the shale layer above it?

#8. Paragraph 4.
It is extremely important that the ephemeral nature of the shallow ground water bearing zones found above the confining shale layer be carefully evaluated as to seasonal water volumes and quality of the shallow ground water (assuming it is of sufficient quantities to permit sampling). According to 75-10-207(1), Montana Code Annotated (MCA) and ARM 16.14.701(1), it is the quality of the ground water that is to be monitored. Therefore, it is important that shallow ground water bearing units be evaluated, as you have indicated with the shallower (above the confining shale) ground water monitoring well installation presented later in the text in Table 1.

A Montana Pollutant Discharge and Elimination System (MPDES) permit may be required from the Stormwater Runoff Program of the Water Quality Bureau based on the fact that runon diverted around the landfill flows into Boyd Creek.

#4. Surface seeps associated with landfilling activities need to be evaluated in greater detail in relation to how they may, or may not affect the hydrogeology at the site (see ARM 16.14.707(1)(e)(vi).

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Also, concerning the above regulatory citation (under item #4), it will be necessary to provide in the Workplan the lithologic logs and/or well completion data (as available) on all domestic and supply wells within a 2-mile radius of the site to locate possible local ground water receptors.

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Approximately how thick is the shale (confining) layer? Use information such as well logs and well completion information available on domestic and/or supply wells in the area for reference.

#7. Paragraph 3.
Please confirm using existing information, the following statements from the Workplan text:

" Water is derived from a "white" to "gray" sandstone unit at depths of 200 to 350 feet (assumed, BGS). Water is under excess pressure and rises to levels which are 40 to 100 feet below ground surface."

Specifically, does this mean there could be 160 to 350 feet of hydraulic head? Does the head of the confined aquifer exceed the thickness of the shale layer above it?

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It is extremely important that the spheroral nature of the shallow ground water bearing zones found above the confining shale layer be carefully evaluated as to seasonal water volumes and quality of the shallow ground water (assuming it is of sufficient quantities to permit sampling). According to 75-10-[illegible], Montana Code Annotated (MCA) and ARM 16.14.[illegible], the quality of the ground water must be to be monitored. Therefore, it is important that shallow ground water bearing units be evaluated, as you have indicated with the shallower (above the confining shale) ground water monitoring well installation presented later in the text in Table 2.

WORKPLAN

Safety.

#9. Please include the use of an explosimeter or explosive gas indicator to monitor the work area nearest the borehole during drilling. In the event that methane gas has been generated at the site through the decomposition processes associated with the degradation of solid waste, excavation operations and drilling safety depend on continuously monitoring the percent of the lower explosive limit (LEL) for methane gas at the ground surface during the advancement of the borehole. LEL readings should be recorded on the boring logs.

#10. Page 7, Item 2.
The units of the written map scale need to be corrected in item 2 to: 1 inch = 200 feet.

Also, note these units are incorrect on Page 11, Item 15, and should be corrected to: 1 inch = 200 feet.

#11. Page 7, Item 4.
A preliminary review of the data mentioned under this item should have been done in preparation for this Workplan. A map of the tentative boring and backhoe test pit locations shall be provided as part of this Workplan (see comment #12, below for further explanation).

Subsurface.

#12. Paragraph 1.
The regulations [ARM 16.14.703(1)(a)(x)(K)(III)] require that a total of 30 excavations be made for a 30 acre site. Seventy-five percent of these excavations (i.e. 23) may be backhoe test pits to a depth of at least 10 feet below ground surface (BGS). Seven excavations are required to be borings. The borings shall be at least 20 feet below the base of the waste disposal area.

The only substitution for the above requirements would be replacing several of the required backhoe test pits with lithologic descriptions from the "high wall" area. Because the installation of ground water monitoring wells are required at this site, deeper borings advanced into the ground water and/or the aquifer may serve a two-fold purpose, and may, in some cases account for more than 1 of the required number of borings. A preliminary boring and backhoe test pit map with some explanation might provide sufficient documentation to make some site-specific judgements and limited flexibility concerning the needs for adequate characterization of the hydrogeology and soils at the site (see comment #11 above).

<u>SECURITY</u>

<u>Safety</u>.

#8. Please include the use of an explosimeter or explosive gas indicator to monitor the work area nearest the borehole during drilling. In the event that methane gas has been generated at the site through the decomposition processes associated with the degradation of solid waste, excavation operations and drilling safety depend on continuously monitoring the percent of the lower explosive limit (LEL) for methane gas at the ground surface during the advancement of the borehole. LEL readings should be recorded on the boring logs.

#10. Page 7, Item 1.
The units of the written map scale need to be corrected in item 1 to: 1 inch = 200 feet.

Also, note these units are incorrect on Page 11, Item 15, and should be corrected to: 1 inch = 200 feet.

#11. Page 7, Item 4.
A preliminary review of the data mentioned under this item should have been done in preparation for this Workplan. A map of the tentative boring and backhoe test pit locations shall be provided as part of this Workplan (see comment #12, below for further explanation).

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#13. Page 7, Item #6.
As noted above, 23 backhoe test pits are required. Supplemented with lithologic descriptions from the "high wall" area, this number could possibly be reduced by 5, leaving 18 required backhoe test pits, and 7 borings.

#14. Page 8, Item #6 & #7.
Soil samples should be described at a minimum of every 5 feet, and at lithologic changes. The State recommends (but does not require) whenever practical, for the characterization of the hydrogeologic and soils, to collect split spoon samples at lithologic unit changes and at the top of the saturated zone(s).

#15. Page 8, Item #7.
Re-evaluate drilling methods for monitoring well hole advancement based on ARM 16.14.705(2) which states that:

> **"Drilling fluids and water** (city water, not well water) **may be used to drill monitoring wells <u>only</u> when there are no reasonable alternatives. If drilling fluids are used, the owner/operator shall document the type of fluids, any additives used and the source of water shall be identified."**

#16. Item 7.
Soil sampling interval frequencies are addressed in comment #14, above.

#17. Item 7.
Collection of field-screened soils for future laboratory analysis is a useful tool in some cases, but it is not required by the State.

> Please note that the sole use of a photoionization detector (PID) to screen field soil samples may not adequately detect many of the possible landfill leachate constituents, such as chloroflourocarbons.

#18. Item 7.
The drilling rig should arrive at the site properly decontaminated prior to leaving the last job. You do not want to decontaminate a rig at your site that has been used elsewhere, and possibly has not been properly decontaminated before leaving that site.

> Decontamination of the drilling <u>equipment</u> is required after each boring, whether visual contamination has been observed or not [see ARM 16.14.705(3)].

#13. Page 7, Item #5.
As noted above, 35 backhoe test pits are required. Supplemented with lithologic descriptions from the "high wall" area, this number could possibly be reduced by 5, leaving 18 required backhoe test pits, and 7 borings.

#14. Page 8, Item #6 & #7.
Soil samples should be described at a minimum of every 5 feet, and at lithologic changes. The State recommends (but does not require) whenever practical, for the characterization of the hydrogeologic and soils, to collect split spoon samples at lithologic unit changes and at the top of the saturated zone(s).

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The drilling rig should arrive at the site properly decontaminated prior to leaving the last job. You do not want to decontaminate a rig at your site that has been used elsewhere, and possibly has not been properly decontaminated before leaving that site.

Decontamination of the drilling equipment is required after each boring, whether visual contamination has been observed or not (see ARM 16.14.705(3)).

#19. Page 8, Item #8.
It may not be prudent to install monitoring wells in each boring, however if the point would be helpful in determining the direction of ground water flow and gradient, this location could be appropriately completed as a piezometer. If ground water sampling is anticipated at any of these borings, a monitoring well must be installed. No open-hole borings may be allowed to remain open longer than an 8-hour work day period. All open-hole borings shall be filled with grout, if not completed as piezometers or monitoring wells [see ARM 16.14.713(2), 36.21.804, & 36.21.64A].

#20. Table 1, Page 9.

a. With no location map, what do the well numbers mean?

b. What does the "a" mean beside well numbers 2,3,& 4? This explanation should appear as a footnote to the Table 1, or be discussed in the text.

i. Explain whether these "a" wells are intended to be clustered or nested wells (i.e. well(s) construction diagram). Seals in nested wells have a tendency to leak over time and are not recommended for monitoring ground water quality. Also, with as much head as you indicated on the confined aquifer, a nested completion may be logistically impossible, or extremely impractical. Please provide greater detail for these proposed well completions, using any local hydrologic data that is available.

c. Which well, or group of wells will be used for the background well? Where will the proposed background well(s) be located?

d. If an unconfined ground water bearing zone is found beneath the site, as indicated in the text, that has sufficient water volume (i.e. ability to recharge a well back to the original static water level in an 8-hour period), would 3 deeper confined-aquifer wells be necessary before sampling the water quality of the unconfined zone? Would it be possible that one deeper hydraulically down gradient well would suffice initially? Because casing will have to be set before drilling into the deep confined aquifer to prevent any possibilities of cross contamination between the shallow ground water bearing zones, the cost of these wells would be much higher.

#19. Page 8, Item #3.
It may not be prudent to install monitoring wells in each boring, however if the point would be helpful in determining the direction of ground water flow and gradient, this location could be appropriately completed as a piezometer. If ground water sampling is anticipated at any of these borings, a monitoring well must be installed. No open-hole borings may be allowed to remain open longer than an 8-hour work day period. All open-hole borings shall be filled with grout, if not completed as piezometers or monitoring wells (see ADM 16.14.773(2), 36.21.804, & 16.21.644).

#20. Table 1, Page 9.

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d. Which well, or group of wells will be used for the background well? Where will the proposed background well(s) be located?

e. If an unconfined ground water bearing zone is found beneath the site, as indicated in the text, that has sufficient water volume (i.e. ability to recharge a well back to the original static water level in an 8-hour period), would 1 deeper confined-aquifer wells be necessary before sampling the water quality of the unconfined zone? Would it be possible that one deeper hydraulically down-gradient well would suffice initially? Because cutting will have to be set before drilling into the deep confined aquifer to prevent any possibilities of cross contamination between the shallow ground water bearing zones, the cost of these wells would be much higher.

#21. Page 9, Item 9.
After the ground water monitoring wells are installed, they must be adequately developed and allowed to equilibrate to approximately the original ground water level. Please include and briefly discuss the well development procedures planned for the proposed well completions.

Will the wells be developed by hand with a bailer, using the drilling rig and a bailer, or using a down-hole pump? How will this equipment be decontaminated between wells? Will dedicated pumps be installed in each well? If so, what type of pumps will be installed?

#22. Page 9, Item 9.
A Sampling and Analysis Plan (SAP) will be required in order to perform ground water sample collection and laboratory analysis. Although ARM 16.14.706(1) states that an SAP is to be prepared by the owner/operator or the representative consultant, the Department has decided that a sample SAP be developed by the State as guidance. This task may be accomplished in the next 60 days. However, if you need to conduct preliminary ground water sampling for purposes related to the Hydrogeologic and Soils Study, a brief Standard Operating Procedures (SOPs) for ground water sampling will be satisfactory. An approved SAP will be necessary for conducting the semi-annual sampling events, once the ground water monitoring network is in place.

#22. Page 9, Item 9.
There is no need for sample analysis to:

"obtain a baseline sample suite".

The required parameters and chemical constituents are given in ARM 16.14.706 Table 1. If an exceedence of one or more of the constituents is detected, an expanded constituent list may be required for re-sampling [see ARM 16.14.708(1)(c)].

#23. Page 9, Item 11.
Define: **"recovered samples"**, what does this include? Note, ARM 16.14.706 Table 1 is for ground and surface water samples.

#24. Page 10, Item 12.
Please include one or more in-situ unsaturated zone hydraulic conductivity tests to confirm laboratory or other field permeability test results [see ARM 16.14.703(1)(a)(x)].

#25. Page 10, Item 12, & Page 11, Item 14.
From the Hydrogeologic and Soils Study results and data

#21. Page 9, Item 3.
After the ground water monitoring wells are installed, they must be adequately developed and allowed to equilibrate to approximately the original ground water level. Please include and briefly discuss the well development procedures planned for the proposed well completions.

Will the wells be developed by hand with a bailer, using the drilling rig and a bailer, or using a down-hole pump? How will this equipment be decontaminated between wells? Will dedicated pumps be installed in each well? If so, what type of pumps will be installed?

#22. Page 9, Item 9.
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#24. Page 9, Item 11.
Define: "recovered samples", what does this include? Note, ARM 16.14.706 Table 1 is for ground and surface water samples.

#24. Page 10, Item 12.
Please include one or more in-situ unsaturated zone hydraulic conductivity tests, laboratory or other field permeability test results (see ARM 16.14.707(1)(a)(x)).

#25. Page 10, Item 12, & Page 11, Item 14.
From the Hydrogeologic and Soils Study results and data

calculations, the direction of ground water flow, the velocities, the hydraulic conductivities, transmissivities, effective porosity and estimated leachate transport times in the ground water shall be presented in the final Hydrogeologic and Soils Report [see ARM 16.14.703(1)(a)(ix)].

Evaluation of Geotechnical Data

#26. Please correct the item numbering system. There are two number 13's on Page 10.

#27. Page 10, Item 13 (2nd one).
What is:

"TR55 methodology"?

#28. Page 10, Item 13 (2nd one).
Landfill **"expansions"** require licensing application procedures. Extensions inside the licensed facility, might be a more applicable terminology in this case, as Mister M has no application pending for an expansion area(s).

Several of the above comments were expressly made for the benefit of clarification. If you have any questions concerning these issues, please give me a call. Some of these items may be easily resolved with a documented telephone conversation and follow-up written confirmation or revisions. Good weather is nearly upon us and every effort should be made to expedite the field activities during this season.

NOTE: Explosive gas (methane) monitoring will be required at all of the active solid waste disposal facilities on October 9, 1993, according to 40 CFR 258.23. These rules are presently being incoporated into the State ARM, Title 16, Chapter 14, Subchapter 5.

A written response or revised Workplan addressing the above items shall be submitted to the Montana Department of Health and Environmental Sciences Solid Waste Program within 15-calendar days from the date of this letter.

Sincerely,

Pat Potts

Pat Potts
Environmental Specialist

calculations, the direction of ground water flow, the velocities, the hydraulic conductivities, transmissivities, effective porosity and estimated leachate transport times in the ground water shall be presented in the final Hydrogeologic and Soils Report [see ARM 16.14.703(1)(a)(ix)].

Evaluation of Geotechnical Data

#25. Please correct the item numbering system. There are two number 13's on page 10.

#27. Page 10, Item 13 (2nd one).
What is:
"TSS methodology"?

#28. Page 10, Item 13 (2nd one).
Landfill "expansions" require license application procedures. Extensions inside the licensed facility, might be a more applicable terminology in this case, as Mister M has no application pending for an expansion area(s).

Several of the above comments were expressly made for the benefit of clarification. If you have any questions concerning these issues, please give me a call. Some of these items may be easily resolved with a documented telephone conversation and follow-up written confirmation or revisions. Good weather is nearly upon us and every effort should be made to expedite the field activities during this season.

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A written response or revised Workplan addressing the above items shall be submitted to the Montana Department of Health and Environmental Sciences Solid Waste Program within 15-calendar days from the date of this letter.

Sincerely,

Pat Potts
Environmental Specialist

cc: Robert W. Gillespie, P.E., Abenaki Geoenvironmental, Inc., P.O. Box 1018, Lewistown, MT 59457

Roger Godfrey, R.S., Central Montana Health District, 404 4th Ave. South, Lewistown, MT 59457

Fergus County Commissioners, 712 W. Main Street, MT 59457

City of Lewistown, 305 Watson Street, Lewistown, MT 59457

path: sw\mrm.wk2
file: fergusco/mister m/grd wtr

Fergus

ROUTE SLIP

DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES

TO: Proof Lit DATE: 4/8/93

1. Pat C PM
2. Jon D JD
3. Roosevelt Duane RD

- [x] Approval
- [ ] Comment
- [ ] Necessary Action
- [ ] Note and Return
- [ ] Note and File
- [ ] Investigate
- [ ] Prepare reply
- [ ] Signature
- [ ] See Me
- [ ] As requested
- [ ] For your information
- [ ] Per Conversation

REMARKS:

Sw/MRM. WK2

mailed 4-13-93 EM

FROM: P3

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES
Solid and Hazardous Waste Bureau
Solid Waste Program
(406) 444-1430
MARC RACICOT, GOVERNOR
FAX # (406) 444-1499
STATE OF MONTANA
OFFICE LOCATION 836 Front Street Helena, Montana
MAILING ADDRESS: PO BOX 200901 Helena, MT 59620-0901

June 14, 1993

Marvin Mintyala
Mister M Disposal
HCR 85, Box 4066
Lewistown, Montana 59457

RE: **MISTER M DISPOSAL, FERGUS COUNTY - LICENSE NO. 302**
APPROVAL FOR THE WORKPLAN FOR THE HYDROGEOLOGIC AND SOILS STUDY.

Dear Mr. Mintyala:

The revised (April, 1993) Workplan for the Hydrogeologic and Soils Study/Report for the Mister M Disposal facility has been approved by the Montana Department of Health and Environmental Sciences Solid Waste Program (the Department) for implementation. There are several important points that need to be emphasized and/or clarified to ensure complete understanding by all parties involved:

1. In Figure 3 of the Workplan, the ground water depth in existing well "A" is depicted as being 180 feet deep. Is the well "A" location on this map representing the Marvin Mintyala well log provided in Appendix B of the Workplan? If so, the well log indicates that the Mintyala well encountered ground water at 80 feet deep, with the well reaching a total depth of 120 feet. Please provide clarification on this issue.

2. On page 6, the rise in water level for the aquifer now reads 25 to 100 feet below ground surface (BGS). In the original Workplan (January, 1993) this range in aquifer head was 40 to 100 feet. What new or additional information has caused these figures to change? Please provide this revised information.

3. Although 7 borings are required to characterize the soils and hydrogeology at this site according to the Administrative Rules of Montana (ARM) 16.14.703(1)(a)(x)(K)(III), all of these borings need not be completed as ground water monitoring wells, unless it is pertinent to a more intense ground water characterization of the site, and/or the site is quite extensive areally.

4. On page 8 item #7, split-spoon intervals were described as being taken at 55-foot intervals in the revised Workplan. Is this a typo? Shouldn't this read 5-foot intervals?

5. According to the ARM 16.14.703(1)(a)(iii)(A), as part of the hydrogeologic and soils characterization at the site, the hydraulic conductivity shall be determined using aquifer pump and/or slug tests. From this and the other additional field investigatory information acquired, the ground water flow rate and the rate of contaminant migration should be calculated.

6. ARM 16.14.703(1)(a)(x) addresses unsaturated zone characterization requirements. Item (C) under this rule, should specify the determination of <u>un</u>saturated zone hydraulic conductivity.

7. In selecting appropriate ground water monitoring well locations, the Department would like to emphasize the definition and the applicability of the term "point of standards application". This refers to initial ground water monitoring wells being installed no greater than 450 feet from a waste disposal unit [see ARM 16.14.701(36) & 16.14.708(3)].

> In the future, any newly promulgated rules will address this same situation using the terms "relevant point of compliance" and/or "point of compliance" (POC). The POC is described as a point being no more than 150 meters from the waste management unit boundary and shall be located on land owned by the owner of the solid waste landfill unit.

8. It is very important that as you stated in the Section entitled "<u>Surface</u>" item #2, in the Workplan, a large scale map of the site be provided with the Hydrogeologic and Soils Study/Report. It would have been helpful to have had a larger scale map than that presented in Figure 2 of the Workplan. This would have aided the Department in determining the appropriateness of the proposed well boring locations.

Due to this lack of detail of the Workplan map presentation, the Department feels that an on-site observation of the proposed well boring locations be made. The Department is fully aware that with the additional soils and ground water information acquired from drilling each boring, ideas and plans may change in the field to adjust boring locations to more adequately determine and delineate any ground water contamination that might possibly be emanating from the landfill.

The comments listed above may be addressed in the Hydrogeologic and Soils Study/Report which will need to be submitted to the Department within 180 calendar days from the date of this approval letter [see ARM 16.14.703((1)(c)(ii)(C)].

If you have any questions during the investigatory portion of this study/report, please give me a call.

Sincerely,

Pat Potts

Pat Potts
Environmental Specialist

cc: Greg Menge, Abenaki Geoenvironmental, Inc., P.O. Box 1018, Lewistown, MT 59457

Roger Godfrey, R.S., Central Montana Health District, 404 4th Ave. South, Lewistown, MT 59457

Fergus County Commissioners, 712 W. Main Street, Lewistown, MT 59457

City of Lewistown, 305 Watson Street, Lewistown, MT 59457

path: sw\mmr.app
file: fergus co/mister m/grd wtr

MESSAGE CONFIRMATION

06/15/93 10:50

SESSION NO.= 176

DATE	TIME	S,R-TIME	DISTANT STATION ID	MODE	PAGES	RESULT	
06/15	10:47	02'10"	406 538 5800	G3 -S	03	OK	0000

Fergus Co.

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DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES

TO: Proof it

DATE: 5/5/93

1. Pat C PPC
2. Jon D JD
3. Roger / Duane RC

- [x] Approval
- [ ] Comment
- [ ] Necessary Action
- [ ] Note and Return
- [ ] Note and File
- [ ] Investigate
- [ ] Prepare reply
- [ ] Signature
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REMARKS:

sw/mmr.app

Priority!!!

Fax# 538-5800

mailed 6-15-93 lh

FROM: ✓

Abenaki
Geoenvironmental, Inc.

FAX FORM

Date: 11-5-93 Job # 579-03

To: Ms. Patricia Potts

Address: MT. DHES

Telephone Number: (406) 444-0538

Fax/Telecopier Number: 406 444-1499

From: R.W. Gillespie

No. of Pages Including This One: 3

Description: Draft Executive Summary. Please Review and Be Very Critical.

If you do not receive all of the pages sent, please call immediately at:

(207) 324-8008

Fax Number: (207) 324-8042

Table of Contents to follow shortly.

Thank You!

P. O. BOX 2222 MISSOULA, MT 59806 (406) 884-2109 P. O. BOX 1018 LEWISTOWN, MT 59457 (406) 538-5500

Abenaki
Geoenvironmental, Inc.

DRAFT

EXECUTIVE SUMMARY

The Mister M landfill, located in the southwest quarter of Section 8, Township 15N, Range 19E east of Lewistown, Montana, has been in operation as a commercial landfill since circa 1958. It receives primarily residential or household waste including white goods. Woody debris, demolition debris, and metals are also accepted at the facility although the operators review loads of those materials before accepting them for disposal. Asbestos?

The landfill is constructed in a coulee which extended from the crest of a north-south trending ridge southwestward toward Hwy. 200. Based on older aerial photographs, filling began near the middle of the coulee and progressed both up and downhill. Prior to commencement of filling, the area was grassland and did not show signs of ground water discharge such as springs or long, sinuous areas of lush vegetation. Cover consists of on site soils which are placed and compacted daily. The open or working face rarely exceeds one-half acre.

strike/dip?

Geology of the site is dominated by Cretaceous age sediments of the Kootenai Formation, abutted by Falls River sandstones to the north and west. Kootenai sediments include shales and claystones with minor sandstone beds and one bentonite bed. The shales have weathered to a moderatley plastic silty clay for depths of 5 to as much as 20 feet. Flex wall permeability tests on undisturbed shelby tube samples show permeability is on the order of $1x10^{-7}$ cm/sec. Slug tests performed in certain monitoring wells provide the same order of magnitude. Atterberg limits tests provide additional correlation. Briefly, the landfill is situated on weathered clay shale which acts as a liner much the same as a currently designed landfill would. Overall shale thickness is greater than 150 feet in the area. The aforementioned bentonite bed is included in the shale underlying the disposal mass. The Kootenai Formation continues to the south where it is overlain with colluvium and alluvium of Boyd Creek. Driller's logs from the valley floor show about 5 feet of silty clay (colluvium) underlain by 5 to 20 feet of gravel-sand mixtures, which are, in turn, underlain by shales of the Kootenai Formation.

Ground water is not present in the shallow rock at the site. Water well logs for the area show that first ground water is encountered in a sandstone unit at depths of 200 to 350 feet. The potentiometric surface for this aquifer is 40 to 100 feet below ground surface. Monitoring wells drilled for this project did not encounter groundwater except for one located immediately — geo Tech.

DRAFT

adjacent to, and downgradient of, the storm water detention pond. Surface water hydrology indicates that precipitation is used up by evapotranspiration, soil uptake, and runoff. Only negligible amounts can be shown to be available for ground water recharge in the vicinity of landfill drainage basin.

Surface water hydrology shows that the existing pond functions as a detention basin for storms up to and including the 10 year event. This matches past history as presented to us by the owners. Additional pond capacity is necessary to provide adequate treatment under current regulations, and design will be provided under separate cover in the near future.

Methane monitoring wells were installed at two locations close to the downgradient edge of the landfill. Initial readings show that oxygen levels are within normal ranges and methane was undetectable. A methane monitoring plan is being developed for regulatory compliance.

Based on the investigations and engineering analyses we conclude that ground water is not present in measurable quantities within the basin containing the landfill. Hydrologic evaluations support this conclusion from the water balance standpoint. Migration of contaminants via ground water is unlikely and would, based on in situ and laboratory permeability measurements, take in excess of 200 years to reach Hwy 200 or the sandstone aquifer at depth. Therefore, the owner submits the landfill as a no migration petition under Section 16.14.714 of Subchapter 7. ?

Lateral off site Times?

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES
Solid and Hazardous Waste Bureau
Solid Waste Program
MARC RACICOT, GOVERNOR 406/444-1430
FAX # (406) 444-1499
STATE OF MONTANA
OFFICE LOCATION 836 Front Street Helena, Montana
MAILING ADDRESS: PO BOX 200901 Helena, MT 59620-0901

December 9, 1993

Robert W. Gillespie, P.E.
R.W. Gillespie & Associates
P.O. Box 1730
Sanford, Maine 04073

RE: **MISTER M DISPOSAL, CLASS II, FERGUS COUNTY - LICENSE NO. 302**
REVIEW OF THE "GEOHYDROLOGIC CHARACTERIZATION"

Dear Mr. Gillespie:

On November 15, 1993, the Montana Department of Health and Environmental Sciences' Solid Waste Program (the Department) received the "Geohydrologic Characterization for the Mister M Landfill". One of the primary purposes of such a study is to determine the depth to ground water beneath the site and the natural quality of the ground water in the area, hydraulically upgradient as well as down gradient from the site. Normally, drilling to the uppermost water-bearing unit at the perimeter of the waste management unit boundary(s) is generally the most obvious method for hydrogeologic characterization of a site. This approach may also provide locations for the installation of ground water monitoring wells as part of the final monitoring network at a site.

A brief preliminary interpretation of the local geology and hydrology supplied in the Work Plan for the Hydrogeologic and Soils Study at the Mister M Disposal facility inferred that significant quantities of ground water would not be encountered until the confined Kootenai Sandstone aquifer was penetrated (approximately 80 to 140 feet deep from supply well data, A and H). This aquifer is used as the primary drinking water source for this rural area. Based on this information, the Department was reluctant to encourage drilling through the confining layer into this drinking water aquifer. Numerous domestic wells in the area were expected to provide sufficient information to be able to extrapolate the approximate depth of the aquifer beneath and immediately adjacent to the landfill. It was the Department's understanding that the entire unsaturated zone would be drilled, establishing the top but not penetrating the confining shale layer directly above the aquifer, both in the hydraulically upgradient portion of the site, as well as down gradient from the facility.

As stated in the Geohydrologic Assessment, geologic beds dip to the southwest (section 3.2, page 17). In the boring for MW-6, which is located topographically lateral, to relatively upgradient from the disposal area, a sandstone is described at the surface which extends to 28 feet deep. This sandstone appears to represent a direct recharge zone at the ground surface. If geologic beds dip at 6 to 12 degrees to the southwest (as stated in the text), this sandstone should be present beneath the site, and should exist at depth on the down gradient side of the site (i.e., to the south-southwest). Figure 5 of the report, shows the general direction of ground water flow at the site to be to the southwest. Figure 4, shows an increasing thickness of the Kootenai Formation west-southwest. This data would highly persuade the Department to consider that the direction of leachate migration and ground water flow would be to the southwest at this site. The sandstone identified at the surface in MW-6 needs to be extrapolated down dip, beneath the site. This sandstone may act as a conduit for the recharge water topographically upgradient from the site. As it migrates southwesterly (down gradient) into, or beneath the landfill, it should be monitored for water quality (assuming saturation) at the down gradient (south) side of the facility.

Deficiency #1

Due to this confusion in hydrogeologic interpretation and correlation, it is imperative that cross sections accompany this report. It is also a requirement according to the Administrative Rules of Montana (ARM) 16.14.703(1)(a)(iv), 16.14.703(1)(a)(iv)(B), and 16.14.703(1)(a)(v)(B). These sections constructed in both north-south and east-west directions should include monitoring wells, borings, test pits (as applicable), and domestic/supply wells adjacent to the site. Sandstone and shale zones need to be correlated from lithologic descriptions found on boring logs and water well logs, as available. Water levels approximated from the domestic/supply wells need to be incorporated into the cross sections. The approximate depth of the waste at the disposal facility should be extrapolated into these sections, as well. It is important that the formations above the confining layer for the local aquifer be fully penetrated and the possibility of any water-bearing zones directly down gradient from the disposal area be investigated in the field (i.e., by drilling), if an adequate demonstration cannot be made in representative cross sectional form at this time from the field data already acquired at the site.

Deficiency #2

It was reported that slug tests were conducted in several of the wells installed in the unsaturated zone. Please provide the infiltration rates observed in the field from these tests, the calculations, and the individual hydraulic conductivity (K) values calculated from each test. Only the geometric mean (i.e., 1×10^{-6} cm/sec.) is provided in the text for these test results.

The transformed hydraulic conductivity value correlating horizontal K, with vertical K in the unsaturated zone will require additional background documentation as to the application of this value. Is Cedegren (1968), listed on page 14 of the text, the reference for the transformation ratio approach presented on page 19 of the text? Please provide the necessary documentation to review these calculations and their applicability.

Deficiency #3
The "Executive Summary" addresses the request for a no-migration petition approval. However, the "Geohydrologic Characterization" does not clearly reach this conclusion, and/or request a no-migration petition approval. If there is adequate site characterization information from the investigation conducted, a conclusive demonstration for a no-migration petition approval should be presented in the site characterization assessment.

The Department has targeted the three primary areas of deficiency in the "Geohydrologic Characterization of the Mister M Landfill" report. The Department believes that if these essential issues are clarified and further documented, clarity in interpretation of the data may be accomplished and possibly a no-migration petition might be considered.

Please Note:
1. Department-approved monitoring well completion forms (enclosed) must be appropriately completed and included in the response to these comments, as they are required according to ARM 16.14.705(11).

2. With reference to the statements made under the 7.0 CLOSURE section of this report, any documents, reports, applications, etc. required according to ARM are public record. The Department's files must remain open for public review during normal working hours.

It is essential that Mister M Disposal address all of these comments on a timely basis, as the facility is required to monitor the quality of the ground water beneath the site [Section 75-10-207(1), Montana Code Annotated], if in fact shallow ground water bearing zones do exist hydraulically down gradient. The Department will require a response concerning the above comments within 45 calendar days from the date of this letter.

If you have any questions, please give me a call.

Sincerely,

Pat Potts

Pat Potts
Environmental Specialist

path: sw\fergusmr.hss
file: fergusco/mister m/grdwtr (corr)

enclosure - Monitoring Well Completion Form

cc: Mr. Marvin Mintyala, Mister M Disposal, HCR 85, Box 4066, Lewistown, MT 59457
Roger Godfrey, R.S., Central Montana Health District, 404 4th Ave. South, Lewistown, MT 59457
Fergus County Commissioners, 712 W. Main, Lewistown, MT 59457
City of Lewistown, 305 Watson Street, Lewistown, MT 59457

Fergus Co.

ROUTE SLI[illegible]

DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES

TO: Proof CU DATE: 12/8/93

1. Pat C PPC
2. Jon D JD
3. Roger T RT

- [x] Approval
- [ ] Comment
- [ ] Necessary Action
- [ ] Note and Return
- [ ] Note and File
- [ ] Investigate
- [ ] Prepare reply
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REMARKS:

SW/fergusmr.hss

mailed 12-10-93 eh

FROM: P3

THIS FACILITY IS IN FORMAL LITIGATION.

PLEASE DO NOT FILE ANY DOCUMENTS IN THIS FILE.

PLEASE GIVE ALL DOCUMENTS TO CAROL UTICK SO THAT THEY CAN BE LOGGED INTO THE DATA BASE AND THEN PUT INTO THE FORMAL LITIGATION FILE.

THANK YOU.

DATE May 91